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[OFFICIAL CIRCULAR.]

American Gas Light Association.

OFFICE OF THE AMERICAN GAS LIGHT ASSOCIATION,
No. 32 PARK PLACE, ROOM 36, NEW YORK, July 28, 1884.

To The Members of the Association:

I am desirous of impressing the members of the association with the nearness of our annual meeting; the two and a half months which remain before we assemble at Washington will not be long in passing away. It is therefore high time we should bethink ourselves of the meeting, and make such arrangements as will ensure its success. While it is true that to the officers and committees of the association we must look for the preparation of the details of the convention, it is also true, and in no lesser degree, that the success or non-success of the meeting in its main aim and purpose—namely, the reading and discussing of papers—will rest with the members themselves. It would be idle to attempt to controvert this self-evident statement. I am anxious to bring this truism home to each individual member of the association, for the responsibility rests on each, not merely on the members at large.

I said a moment ago that the main object of our annual convention is the reading and discussing of papers; and while the presentation of dissertations and the criticising thereof are so closely allied as to warrant their being considered the one purpose of our meeting, there is nevertheless a certain degree of separateness in this particular. They each stand on distinct grounds to this extent, that the success of the one does not perforce carry with it the success of the other. Thus an essay read before a body of technical hearers may be one of great erudition, but the discussion to which it leads may—owing to the lack of opportunity afforded the members for preparing themselves for the task of criticising—be puerile. Here, then, is the point in its double form which I am solicitous to force on each member; namely, that in order to make a success of the literary part of our meeting, we should not only have a sufficiency of papers, but their titles, and even the main headings of the subject matter should be published so far in advance as to permit each person so to prepare himself for the discussion that he in his turn may be able—by reference to his records, or otherwise—to supplement the paper by some valuable and positive information. It remains with the members to say if this can be done. If you will address yourselves to the subject at once the scheme will be feasible; for you can prepare a paper and forward it to me at such a date as will permit its title to be published before the meeting.

To give the members ample opportunity to prepare themselves for the discussion, the papers to be read at the forthcoming meeting should be in my hands by the middle of September.

If this part of the programme is not carried out the coming fall, the fault cannot be ascribed to the secretary, for early in the year he urged you to direct your thoughts toward our Washington meeting. In the circular then issued, which was reproduced in the AMERICAN GAS LIGHT JOURNAL of February 16, 1884, I mentioned the following subjects upon which we needed more light, and which might possibly be deemed worthy of forming a theme for a paper:

Do we gain in the aggregate by mixing coals of different grades?

Is fine coal worth less to the gas maker than lump coal? If so, how much?

What proportion of the gas is given off by a coal at the different stages of the charge, and what is its candle-power?

What is the practical value of tar as fuel, compared with coke?

Does a heavy retort setting require more fuel to maintain the heat than one of a light character?

Do foreign retorts give better results than those of domestic manufacture?

What is the most advantageous weight of coal to charge for a given sized retort?

What proportion of coke is required to heat a bench of three retorts in comparison with fives or sixes?

Is there any positive cure for choked stand pipes?

To what extent do anti-dips reduce the carbon deposit?

Should the gas and tar be separated at the outlet of the hydraulic main, or should they flow away together?

What is the net gain accruing from the use of an exhauster?

What is the net gain in purification account resulting from the introduction of a new washer or scrubber, which works up the ammoniacal liquor to greater strength?

What weight of water should be mixed with lime to attain the greatest efficiency?

Does the valve system of working purifiers present any advantages over the center seal plan?

Is lime or iron the cheaper purifying material?

In laying mains, which is to be preferred, the lead or cement joint?

How often should meters be tested, and is the net variation from correct registration of a number of meters in favor of the company or consumer?

These topics were mentioned, not because they were of overshadowing importance, but by reason of their coming first to mind. There are hundreds of others which might well stand at the head of essays to be presented to the convention, which will readily occur to the members.

In the matter of reconstruction of gas works an ample field of subjects presents itself. During the past summer a great deal of rebuilding and remodeling of gas works has been carried on throughout the country; the gentlemen who have had charge of such work might come forward and tell their confreres of the nature of their undertakings, of the difficulties met and overcome, of the dangers avoided, and last, but not least, of the mistakes made. In fact in this matter of remodeling gas works there is a double possibility for papers. First it would be very interesting to know what underlying principles have been followed this year by those who have had charge of such work; and a paper on this subject, treating of the lines pursued in rebuilding, could not but bring out a vast fund of valuable information. Secondly, a paper treating of the method of construction adopted in some special piece of engineering would doubtless be of value to many another member in planning some future work.

Again, their are doubtless many gentlemen who have struck out in some new line in laying mains or services this summer which would be of interest to the Association; or, perhaps, in overhauling old pipes some information relative to the different kinds of joints has been acquired, which the fraternity would be wiser for knowing.

In truth, the reason we have not more papers at our meetings cannot be from a dearth of subjects, but must rather be ascribed to the difficulty of making a selection. I sincerely trust the members will co-operate with the officers, so that there may be an abundance of papers at our Washington Convention, and that they may be forwarded to the Secretary at as early a date as possible.

In conclusion I would say, any suggestions as to the coming meeting will be thankfully received and duly weighed. Respectfully yours,

C. J. Russell Humphreys, Secretary,

AFTER-THOUGHTS RELATING TO THE ST. LOUIS MEETING OF THE WESTERN GAS ASSOCIATION.

Number III.

The paper read by Mr. B. E. Chollar, of Topeka, Kansas, entitled "Practical Photometry," proved to be one of more than ordinary interest; and I would fain here put myself upon record as thinking that it did not receive a proper share of attention and consideration at the hands of the members of the Association. Certain it is that this subject is very well worthy of close study on the part of the brotherhood of gas engineers.

The writer of this series of "After-Thoughts" had the pleasure and profit of inspecting some tables and diagrams gotten up by Mr. Chollar, which were to be used in connection with his system of photometry. They were not only ingenious, but had the extreme value of exceeding simplicity—a feature in all cases, and under all circumstances, worthy of imitation. I am unable to agree with Mr. Chollar regarding the superior advantage of the German method of obtaining a standard light, even though the author does consider it a much more rational style than that followed by those who accede to the English practice. In this connection I desire to endorse the suggestions contained in the communication of Frederic Egner, as published in the Journal for June 16. If that gentleman can with certainty procure an oil which will always burn as uniformly as the sample tested by him, while making the experiments recounted, it would seem as though such a fluid would furnish a much more reliable standard medium than the sperm candle. M. Violle's fused platinum may approach more nearly to the great desideratum—an absolute unit of light; but its adoption, in a general way, I will venture to say, is not likely to occur with any great degree of speed.

Professor Douglas still firmly adheres to his theory that carbonic acid—in the mode of purification followed by him—is absorbed by the earthy matter which is found mixed with the native oxide. He gives, as an example of evidence in support of his position, the action of the earth in the earth closet, where it does absorb foul gases. The conditions, however, as they appear to me, have no co-relation; indeed, they are totally dissimilar. In the earth-closet the clayey material is expected to absorb about all vapors that are evolved; now, in the gas purifier, there is a constant stream of gas passing through the purifying mixture, and why carbonic acid should be occluded there, while other gases are permitted to pass on, is simply beyond my comprehension.

One perhaps should not condemn Prof. Douglas's theory until he is prepared to offer a more rational one. Having employed oxide of iron almost exclusively as a purifying agent for the last sixteen years, every contribution towards a better knowledge of how to handle it in working (and every discovery connected with its capacity and value) possesses especial interest for me; and my case is doubtless but that of hundreds of others.

Now, if it is the earthy portion of the material which is to be credited as the absorptive agent of CO_2 in the case of Prof. Douglas, why should we not all follow his theory by introducing earth into our oxide boxes in combination with the iron? The figures in the analysis of his gas, as given by the Professor, show that something is accomplishing the work most effectively.

Can it be that he does not remove much of his ammonia in his scrubbers, but permits it to be absorbed by the moisture in his boxes, where it combines with the CO_2? Should this be the case, would there be a sufficiency of ammonia present to remove the CO_2 so effectually? Is there any element or compound in his mixture that will decompose the sulphide of ammonium, formed as the gas traverses the pipes, permittting the SH_2 to go to the iron and NH_3 to combine with the CO_2? It is to be regretted that a perfect analysis of the material was not incorporated as a part of his paper. To come back to our interrogations—can there be a compound present that unites directly with the CO_2 and the resultant carbonate be decomposed by the heat generated during the process of revivification of the oxide?

This removal of CO_2 is a question which should be either thoroughly ventilated through the columns of the Journal, or at our Association meetings.

The paper presented by Mr. E. McMillin, of Columbus, Ohio, and headed "Testing the Value of Coals for Gas Making," was something out of the common run, and full of food for mental digestion. The results reported in it certainly justify the expectation that some labor will be taken by one or more of Mr. McMillin's *confreres* looking to a verification of the tests made. By this we do not wish to imply that Mr. McMillin's figures need verification of themselves; the care taken in studying the matter out shows how conscientious the gentleman must have been in their preparation. No; we hope that similar tests will hereafter be reported in order that comparison may be made over a wide average extent of territory. At the risk of being considered captious we feel impelled to make the remark that it is a pity Mr. McMillin did not give the names of the different coals operated upon.

The large per cent. of loss reported in most of the tests proved somewhat in the nature of a surprise to many that were present. There seems to be no particular relation between the per cent. of loss, and the yield per pound of coal. For instance, Test No. 5 shows a yield of 4.50 feet per pound and a loss of 16.19 per cent., while Test No. 7 shows a yield of only 4.20 to the pound and the loss figures as but 7.34 per cent. Again, No. 9 shows yield of 5.21 and loss of 1.75 per cent., while No. 12 shows a yield of 5.455 and a loss of 4.03 per cent. On the whole, these results would seem to indicate that the material reckoned as lost was not a gas producing substance. We have seen published statements of tests made on English gas coals where the loss ranged all the way from 4 to 15 per cent. of the coal charged.

The per cent. of water developed in many of the tests is very large; the coal, as he reports, with the largest percentage of oxygen showing the largest percentage of moisture or water. This may very properly raise the question of the condition in which oxygen exists in coal. Is there a compound occluded in the coal—of which oxygen is an element—other than H_2O? Laboratory analyses of the coals show them to contain from 3 to 5 per cent. of water; the tests in gas works obtain from 9 to 15 per cent. It is evident that the excess of water comes from the union of a large per cent. of the oxygen present with hydrogen of the coal. Now, since heated carbon decomposes H_2O, why is the oxygen not converted to CO instead of H_2O?

These questions may appear devoid of practical interest to the average gas manager; this is unfortunate, and ought not to be so. The gas manager

should be as thoroughly conversant with every combination and dissociation that occurs in the distillation of coal, as are the scientifically skilled metallurgists in the manipulations of their smelting processes.

"DELTA."

OBITUARY.—MR. C. V. SMITH.

In our issue of July 2d we conveyed to the fraternity, in a few short words, the sad news of the death of a brother engineer whose talent and probity had earned for him a reputation second to that of none other of his fellows in the United States. Recognizing the fact that death's dread messenger speeds on his darksome way without giving premonition of his near approach, nevertheless the termination of Mr. Smith's earthly career came with appalling suddenness, since it was the opinion of all his intimates that, while far from having recovered the usual heartiness and ruggedness of his normal state of health, he was fast recuperating from the symptoms of the disease which, prior to his last trip to Europe, had caused his relatives some anxiety as to its probable results. But if we now have occasion to mourn for the loss of one whom we fain would have retained with us, our grief may be partially abated through remembering that his life was marked with all the traits that go to make up true and honest manhood. What better epitaph than this can be written; what greater consolation can be afforded to his relatives and friends.

In hastily attempting to give a sketch of the character and history of his life, any account that may be given must fall far short of the mark; for the deceased gentleman was one of the sort who never make parade of their actions—the characteristic of his career being to act well his part, deriving his reward from the pleasant consciousness of having done his duty to the best of his ability.

Mr. Charles Vandervoort Smith was born in the city of New York on the 5th day of October, 1837, and came from the loins of that sturdy old Knickerbocker stock that has done so much to promote the material interests of the city of his birth. In the year 1852, when not quite 16 years of age, he entered the service of the Manhattan Gas Light Company, of New York city, as an assistant to the late Dr. William H. Ellet, who had charge of the company's laboratory. He continued in that position until 1857, when he divided his time between the laboratory and the engineer's office, still, of course, holding a subordinate place. In 1866 he was appointed assistant engineer and superintendent in charge of the Eighteenth street station of the company's works.

From this it will be seen how rapidly the young engineer advanced in his profession, when, at the age of 29, he was found competent to be placed in charge of the manufacturing details of a plant—although it was only rated as a station—the character of whose operations were on a scale of greater magnitude (even in 1866) than three-fourths of the gas companies in the United States to-day. In 1871 Mr. Smith was appointed engineer-in-chief, holding that position at the time of his death. The deceased gentleman had the good fortune to imbibe the details of his chosen profession from the fountainhead of no less an instructor than that Nestor of American gas engineers, General Charles Roome; and right earnestly and zealously did he apply himself to mastering the principles of his business; and that he acquired this knowledge is best proven by pointing to the prominence of the company that he served so faithfully and well. It might be here mentioned that Mr. Smith accompanied General Roome to Europe in the year 1857; and it goes without saying that the youthful and ambitious student neglected no opportunity for inspecting the model foreign gas plants, in order that he might store his mind with the facts and figures gained by a comparison of the best European practice with the ideas then in vogue in America.

The deceased gentleman was one of the founders of the Society of Gas Lighting; being elected to the vice-presidency of that body when the office became vacant through the decease of Mr. George W. Edge. To this position Mr. Smith was re-elected each succeeding year. The deceased took a very active part in maintaining the objects for which the Society was founded; and the condolence of the fraternity will go out to the Society of Gas Lighting in having lost by death the services and counsel of such men as George W. Edge, George Dwight, Major G. Warren Dresser, and C. Vandervoort Smith within the space of four years. Mr. Smith was also an esteemed and honored member of the American Society of Civil Engineers, being elected thereto in the year 1876. He was chosen a member of the Board of Directors of that body in the year 1877, and served thereon for the three following years.

In the year 1860 he was united in marriage with a daughter of Mr. J. F. B. Maxwell, a well-known and respected citizen of New York city. His married life was like unto the rest of his career, in that it was harmonious and happy. By this marriage two sons were born; and his wife and children survive him.

During the early part of 1883 Mr. Smith first felt the symptoms of an approaching struggle with disease, but persisted in attending to the routine of duty, refusing to believe that his retained strength would prove insufficient to the task of conquering what he deemed was nothing likely to prove of serious import. To all those who had the pleasure of a personal acquaintance with the deceased gentleman, such ideas would seem to be well founded, as he had been endowed by nature with a magnificent physical structure, was still but in the first years of the prime of existence, and had never before known what it was to be under a doctor's care. Notwithstanding all this the disease made rapid progress; and toward the close of last autumn the management of the Manhattan Company insisted upon his taking a voyage to Europe. Accordingly, on the 31st of October last, accompanied by his wife and younger son, he sailed for Europe on the steamship Servia. The sea-voyage, and subsequent travel throughout different parts of the old world, appeared to have had the sought-for effect; and those who met him after his return all agreed that, though still not thoroughly keyed up to the proper physical pitch, it was merely a question of time when he would be the "Van" Smith of former days. These hopes were doomed to speedy dissipation. He arrived in New York on May 26, and was soon again in harness, but he gradually felt that his strength was failing, and was obliged to take to his bed. A few short days of intense suffering followed, death intervening on the morning of Monday, June 30.

The funeral services were held at the Church of the Holy Trinity, at Madison avenue and Forty-second street, this city, on Thursday, July 3, amidst a large gathering of relatives and friends. The gas fraternity was prominent in its representation thereat; indeed, all those who had time enough to come on from the neighboring cities were in attendance.

Mr. Smith lived the life of a true Christian gentleman, always courteous, even-tempered, generous and hospitable. His motto through life has been to do unto others as he would have them do to him. Having known him intimately from his earliest boyhood we can truthfully and sincerely attest to the sterling merit of his life and worth.

The Albert Medal of the Society of Arts.

The Albert Medal of the Society of Arts was this year presented to no less a personage than a real "live Yankee"—Mr. James B. Eads. The presentation was made on date of Wednesday, July 16, at the Marlborough House, Mr. Eads receiving the honor at the hands of the Prince of Wales, who is President of the Society. This medal was founded in 1862 in memory of the Prince Consort, and is annually awarded to one who has gained distinguished honor in promoting arts, manufactures or commerce. Among the other 20 recipients prior to Mr. Eads will be found the names of the most celebrated scientists of recent times. This honor is all the more complimentary to the "Yankee" engineer from the fact that his name was suggested to the Society of Arts by the Council of the Institute of Civil Engineers, and the suggestion was unanimously accepted by the members of the first named body. In replying to the remarks made by the Prince of Wales, on the occasion of the presentation, Mr. Eads said that he recognized the award as a token of good will on the part of the Society towards his countrymen, rather than for any merit of his own.

Lightning as a Destroyer of Petroleum Oil.

Here is a partial record of the devastation caused by the destruction of oil storage tanks through strokes of lightning during the prevalence of thunder storms in the months of May and June:

At Cleveland, Ohio, on the 24th of May, a 3,000 barrel tank, owned by the Excelsior Refining Company, and a 30,000 one belonging to Clark Brothers & Co., were fired; loss, $30,000. Tank No. 298, owned by the National Transit Company, containing 25,000 barrels of crude, and located in Karns City, Butler county, Pa., was destroyed on the night of June 1. On the evening of June 19, a stroke of lightning set fire to a 6,000 barrel tank belonging to the New York and Dennison Oil Company, of Tidioute, Pa. Tank No. 7,423 of the National Transit Company, situated at Colegrove, McKean county, Pa., holding 34,300 barrels, came to grief on June 21. We have previously given an account of the destruction, on night of May 23, of the works of the Atlantic Refinery at Point Breeze, just close to Philadelphia, Pa. Lightning struck a large tank, and the fire spread over the entire plant, the conflagration lasting several days before it was entirely subdued. Oil to the extent of 90,000 barrels was destroyed, and the total damage occasioned reached the imposing figure of $450,000.

BAKU PETROLEUM.—According to Professor Mendelyeff's analysis the Baku petroleum contains from 20 to 40 per cent. of lubricating matter, while the American contains but 7 per cent. of this substance. The wells will not average a depth of 500 feet. The deepest well yet drilled in that region is but 8 5 eet deep

[Official Report.—Continued from page 34.]

Seventh Annual Meeting of the Western Gas Association.

Held at the Southern Hotel, St. Louis, Mo., May 14, 15, and 16, 1884.

Second Day—Morning Session.

Upon conclusion of the discussion proper on Prof. Douglas's paper (given in last issue), Vice-President Lansden said, if there were no other questions to be asked concerning the topic treated of by Prof. Douglas, he would like to claim the attention of the Association for a short while. He had had no previous intimation that he (Mr. Lansden) would be called upon to preside over the deliberations of the convention, and accordingly had prepared a couple of brief papers. As one of those papers was connected with a subject that had been developed during the course of the discussion on the paper read by his fellow-member, Prof. Douglas, he thought this might possibly be a most appropriate period in the proceedings to read the one that hinged somewhat on the topic last discussed.

This course was unanimously agreed to; Mr. Somerville was called to the chair, and Mr. Lansden, continuing, said:

In the ideas advanced I am rather disposed to agree with Mr. McMillin, and feel inclined to differ from the theory advanced by Prof. Douglas as to the taking up of the light hydrocarbons. However, I will endeavor to explain this a little further on. My paper, which is entitled

DIP-PIPES,

is as follows:

There are several mechanical appliances connected with gas works apparatus that to this day are the occasion of wonderful diversity of opinion, principally occasioned by difference of usage in placing and disposition of the various descriptions of vessels. The dip-pipe, I think, shows more prominently in this lack of uniformity than almost any other part of the machinery.

I would not have you think that I consider this other than a time-worn topic, all scarred up with the marks of many a well-fought discussion; still, I think it is well to revive these questions once in a while, with a view to ascertain whether we are approaching any nearer to the goal of uniformity, or have arrived more closely at the knowledge of what is the best arrangement to make in the disposition of this truly important factor in the system of gas works machinery.

We all know of the great number and variety of inventions that have been introdued with the object of doing away with the seal altogether during the time when the charge is being worked off. Experience has taught me the difficulty of finding two gas plants in which the system of dips is arranged alike. Some claim they run entirely without a seal; others assert that the best results are gained when working at one-eighth; while again we may follow that fraction up in all its various ascending scales, until we reach the place where the followers of the seal system claim advantage in running at two or even three inches. I presume that each one of us has settled this mooted question to suit his individual case; and for that reason I would here like to state, should any discussion follow the reading of this brief note, that the opinions of the gentlemen present will be thoroughly ventilated.

I will say, as the result of my own experience, after having tried a num- of devices for handling the seal during carbonization, that I abandoned them all, and have put this work now solely on my exhausters. This practice I have followed during the past six years; and, from the present phase and condition of the question, propose to continue on under the same method.

In the works under my charge the dips show a seal of from 2½ to 3 inches, the 3-inch seal being located near the end of the main that is farthest from the tar overflow. I have four hydraulic mains, each something over 100 feet in length. I take the tar from one end only. I run the exhauster at from 1½ inches to 2 inches vacuum; this gives me from one-half to three-quarters of an inch which will have to be displaced by the retort gas before it bubbles up through the tar. The benefit I claim from this mode of arrangement is what the gas gains while passing through the hot tar.

I am aware that this is in direct contrast to the theories of a great many engineers, who are consistent advocates of the theory that the gas should be divorced from contact with the tar as soon as is possible. This style of argument is backed up with the opinion that the tar takes more from the gas than it in return gives in the shape of what is valuable as an illuminant.

My experience has been such as to convince me of the faultiness, if not entire error, of such claims; and I hold to the opinion that what the gas thus takes up from the tar goes a long way toward keeping up the candle power. Further, it seems to me as though this were a question which could be easily solved by anyone who has an exhauster in his works.

Perhaps I could make my plan of action more easily understandable by sketching on the blackboard a diagram of my hydraulic main and its connections.

[This the speaker proceeded to do; and, after finishing the drawing, continued.]

I have here tried to sketch the plan of my hydraulic main. Here is the dip-pipe, and there the tar line, also retort connections and seal. I try to run at from ½ to ¾ of an inch seal. I bubble the gas through the hot tar at this point [indicating]. The gas passing from the extreme end of the main has to pass through at this point. I tried the experiment of running at zero for about a week, and then compared the results of such working with the plan here outlined. I found my own plan was to be preferred. I follow out the practice of closely watching the temperature. My gas passes through 300 feet of pipe before it reaches the multitubular. I try to keep the condensers at 70°, and I do not believe in shocking the gas any more than is necessary. I can make naphthaline anywhere. I try to run at a bright orange heat; white heats I do not like; and I agree with the Professor as to his remarks concerning them. I have no stopped standpipes, and no appreciable bother from tar in the main.

Discussion.

Mr. McMillin—Do you run the whole of your gas through the main?

Mr. Lansden—As I stated, I have four hydraulic mains; these four are all connected together to one pipe; then this pipe travels a distance of 300 feet to the exhauster. By this means I find I get a gradual condensation (which is what I want) from the retort house to the succeeding sequence of apparatus.

Prof. Douglas—Allow me to ask what your experience is in regard to the multitubular condenser. Are you in favor of it?

Mr. Lansden—I favor it for this reason: it is the only condenser I can properly control my temperatures with. I have a blank in my office that I require my engineer to fill out twice every 24 hours—at four o'clock in the morning and four o'clock in the evening. I know pretty nearly what quantity of gas I will be required to send out. Should it be necessary to decrease my output, from any circumstance, such as dropping off benches on account of the moon-table system of street lighting (St. Louis still adheres somewhat to this rather antiquated practice), I give the requisite instructions as to amount of water that is to be fed to the multitubular.

Mr. Gimper—What is the temperature of your gas as it leaves the hydraulic main?

Mr. Lansden—About 148° to 150°. It enters the condenser at a temperature of about 140°—that is, after having passed through the 300 feet of pipe.

[The paper was further discussed by Messrs. Somerville, Smith, Starr, Moran, Highlands, Odiorne, and others; but as a great many of the questions were not relevant to the topics embraced in the author's original presentation of the matter, we will not here reproduce them.]

On re-assuming the chair, Vice-President Lansden called upon Mr. E. McMillin, of Columbus, Ohio, to read the following paper on

RETORT FURNACES.

There is, perhaps, no more profitable subject or more fruitful theme for discussion at the present time than that of retort furnaces. The gas furnace—regenerative or otherwise—is deservedly attracting the attention of many gas works managers. Several forms of the gas furnace are patented; just what the patentable features are I am unable to state. But there are other forms and styles for which no patents are claimed. Many claims are made for the economical working of some of these furnaces that seem almost preposterous to managers who have not tried them; but the experience gained during the last month by the use of four furnaces, each heating six retorts, in the Columbus (Ohio) gas works, leads me to believe it quite possible for any of the claims made to be verified.

These furnaces were constructed under the benches, in basement arches, a portion of the arches being cut away to let the gases pass freely up to the retorts. They were patterned after what is commonly known as the Cincinnati furnace, differing from this description only in minor details. The furnaces are 14 inches wide at the grate bars, widening out to 20 inches at top of door; straight walls from this point to within 30 inches of upper floor, then contracting to 14 inches up to retorts. The furnaces are 3½ feet long inside, and we use six grate bars 1½ inches square.

The hot coke is drawn into the furnaces from the retorts through a chute entering the furnace below the floor level. The arches in which these furnaces were constructed are 7 ft. 6 in. wide, and 13 ft. 3 in. high, to level of floor above. The top of ash-pan is set on a level with basement floor; from top of ash-pan to grate bars measures 30 in.; from grate bars to coke chute is 7 ft. 9 in.; from coke chute to air ports, 24 in.

The walls of the furnace proper are 23 in. thick in the sides, 27 in. thick in the back, and 18 in. thick in front. The back wall was made heavier than the sides, partly because it probably sustains more pressure from the coke as it pitches into the furnace down the inclined chute, and sometimes against the back wall; but principally because there was room to make the

walls this thickness at the back, while the sides could not be made so heavy for want of room. The front was made lighter than the sides under the impression that walls 18 in. thick were heavy enough at any point where it could be reached and any cracks kept pointed up, to prevent leakage of air into the furnace.

On each side of the furnaces, along their entire length, breadth, and height, there is an air space 7 in. wide. This leads back into a rectangular space at the back of the furnace, which space is about 3 ft. by 7 ft., and extends up to the under side of the arch sustaining the back end of the retorts. Close-fitting adjustable doors are fitted to the open space, through which admittance is had to the ash-pan. With these sliding doors the supply of air for primary combustion is attempted to be regulated.

On a level with the grate bars, and on each side of the furnace door, there is an opening 5 in. by 9 in., with sliding door, for the admission and regulation of supply of air for secondary combustion. The cold air passing into the large space surrounding the furnaces displaces the warmer air, which is carried up to air ports, and there combines with the carbonic oxide and hydrogen gases from the furnace. I have tested the temperature of the air in the air flues, at a point about 12 inches below the openings into the furnaces, and find that it averages from 280° to 300° F.

When coke is permitted to run low in the furnace, the walls gets much hotter than when the furnace is kept full; hence the variation in temperature of the air entering the furnace. We keep water in the ash-pan, and, in addition, a very small jet of steam is discharged just under the grate bars, which effectually breaks up or prevents the formation of clinker. Our firemen run a flat iron bar over the grate bars about once every hour, to rattle out the ashes and break up a spongy mass, quite brittle, but sufficiently impervious to the air to partially choke the draught if permitted to remain undisturbed.

Once every four days we let the furnace "run down," as the workmen term it; that is, they will put no coke in it for twelve hours, and then clean out everything in the furnace. This we have to do to keep the fine ashes from accumulating. We find no trouble in maintaining good heats while letting the furnace down; in fact the supply of air must be reduced to prevent the furnace getting too hot, until it gets very low. As the depth of the coke is reduced the CO_2 is not broken up; and hence the increased temperature of the furnace. The supply of air for secondary combustion should be gradually reduced during the "letting down" process; and when the door is thrown open to rake out the refuse, the damper on top of stack is closed. When the furnaces are in their normal condition, if I may use that term, the velocity of the air entering the side flues is found to be constant when tested by the anemometer; but the supply of air for the primary combustion is not so easily kept at a fixed velocity. In fact, I find it almost constantly changing; being most rapid immediately after the ashes are rattled out, and gradually slowing up to the time these are again removed.

This feature is, I presume, not peculiar to this form of furnace. In fact the quantity of air entering these gas furnaces, through a given space, probably varies much less than in the old style of furnaces—the greater mass of hot material in the gas furnace apparently tending to maintain a more uniform draught. Still this change of velocity in the air current prevents us obtaining anything like theoretical results. It would appear that, in order to get anything like perfect combustion without using an excess of air, it becomes necessary to constantly change the supply of air for secondary combustion to correspond with the changes of primary supply.

Preventing the formation of clinker is not by any means all that the use of steam accomplishes. To get two feet of carbonic oxide gas, admitting only air to the heated coke, it is necessary to heat four feet of nitrogen to the temperature of your retorts.

I shall not bore you with any calculations to show the loss of heat when using atmospheric oxygen for combustion; but suffice it to say that you do not have to heat any superfluous matter in generating carbonic oxide with steam. Theoretically, we can only get from the decomposed steam the same quantity of heat that was required for its decomposition. But, while that is true, *quantity* of heat is not the only point desired; *intensity* is also highly essential. Again, the steam for use under the grate bars may be generated with coke screenings—a waste fuel—and enable the works to dispose of a saleable commodity that would otherwise have to be consumed in the furnace were steam not used.

But, doubtless, a better, and certainly a more economical way, would be to adopt the plan used by Col. Stedman (where you have sufficient height of stack to give the required draught), and evaporate the water by passing waste gases under the ash-pan. I have seen it somewhere stated that Col. Stedman evaporated as many pounds of water from his ash-pan as he used pounds of coke in his furnace. Up to the point of reducing the temperature of the coke below the combining point with the oxygen of the steam, I can see no great economy in the use of steam. If this statement respecting Col. Stedman's furnace is true, I do not see that he needs any air for primary combustion. In fact, if the steam should all be decomposed there would be no more carbon for the oxygen of the air to combine with, assuming that the per cent. of ash in the coke about equals the per cent. of hydrogen in the steam.

The retorts in our benches heated by gas furnaces are 14 in. by 24 in. by 8 ft. 9 in. long. We can easily charge 300 pounds every four hours, and I think, if necessary, could run it off in three hours; but this we have not tried to do. The quantity of gas per mouthpiece per day depends upon the character of the coal used. We are now using three grades; the lowest making from 3.80 to 4 feet per pound; the second from 4.50 to 4.75 feet; and the third grade from 5 to 5.26 feet per pound.

Having at present six other benches in use, we cannot conveniently measure the quantity made by these four benches; but I think it sufficiently accurate to say that each retort will coke 300 pounds of good Youghiogheny coal in four hours. This would equal 1,800 pounds per day; and 5 feet (which we ought to make) to the pound equals 9,000 feet per mouthpiece. Now, if we charge the same weight of coal into each of the retorts, and draw two retorts out of the six into the furnace, we use one-third of the coke we make; and, furthermore, in calculating under this rule the quantity used, we cut off that ubiquitous fellow ever ready to ask if "that 33⅓ per cent. is by measure or by weight."

Every fourth day each bench uses about one-fifth of the coke made. On other days the quantity will vary with the quality of coal we are carbonizing. With good Youghiogheny coal, three days out of four we will use the coke from ten retorts in 24 hours. Now, as there are six retorts to the bench, and each charged six times in 24 hours it equals 36 retorts, and ten is 27 7-10 per cent. of 36. Again, if the coal yields 65 per cent. (or 65 pounds) hot unquenched coke for each 100 pounds coal charged, and we use 27.7 per cent. of that coke, we are then using a fraction over 18 per cent. of the weight of the coal charged. But we do occasionally run on nine retorts per day. We then use one-fourth of the coke made, or 16¼ per cent. of coal charged. By a pretty free use of steam we have run, for two or three days at a time, with nine retorts to the bench, using coke from coal that gives but 58 pounds of coke for 100 pounds of coal; in this case we use but 14½ per cent. of coal charged. With the old form of furnace we use about one half of all the coke we make.

The saving in fuel is by no means all the advantage to be obtained from the gas furnace. With our old benches we average one man to every 8 retorts; they work in gangs of three each. The old retorts are smaller and, with the settings in use, we can charge but 200 pounds per mouthpiece. The stokers do not take care of the coke. With our new benches we employ the same number of men, but charge 300 pounds per mouthpiece; and, consequently, make 50 per cent. more gas per man, and they *do* take care of the coke. Two men remain on the upper floor and do the drawing and charging. The coke all falls either into the furnace or through the floor into a barrow placed below to receive it. On the upper floor there is no coke to move or handle, no fires to clinker, no ashes to wheel out—everything is as clean and pleasant as the men could possibly desire. In the basement the helper quenches the coke, wheels it to the dump once every hour, rattles out the ashes, and cleans out one furnace each day. No fire is visible any where; and in fact the men, both above and below, have much less manual labor in producing 9,000 feet per mouthpiece with the new, than they had to perform, while making 6,000 feet per mouthpiece, with the old benches. Some of this gain, however, is due to the new retorts being longer than the old.

We shall construct four similar furnaces under benches set on basement arches. I am inclined, however, to believe that in attempting to get a furnace so deep that it would be impossible for any carbonic acid to escape being decomposed, and in this way get the most economical results from the fuel, I have possibly erred on the other side. We are troubled some with fine ashes up some distance in the furnaces, which, together with the great depth of coke, obstructs the draft if not carefully attended to. The time required for the coke to pass from top to bottom of the furnace is ten to twelve hours, and as there is a little combustion occurring all the way up quite a bulk of ashes is set free in the body of the coke. This trouble, if I may dignify it by so strong a term, may, in a measure be caused by air entering through cracks in the walls of the furnaces, though the absence of clinker tends to disprove this idea. Bringing our steam into the space below the grate bars from steam boilers that generate steam for other purposes, as we do, it is not easy to calculate the quantity of oxygen introduced in this way; and we are, therefore, unable to determine by observation or calculation whether any air is getting into furnaces through cracks in the walls. In this respect Stedman's plan is certainly superior to the one we have followed.

In regulating the quantity of air for secondary combustion I ascertain about the weight of coke entering the furnace each day, deduct the per cent. of ash, calculate the quantity of carbonic oxide this will generate, ascertain the velocity of the air entering air chambers, and adjust the openings so as to admit the almost exact quantity required to burn CO to CO_2. As before

stated, we find but very little variation in the velocity of air entering air chambers.

I have not yet made any analysis of the escaping gases, nor determined the temperature at which they escape from the settings. Our flues discharge only 3 feet above top of benches. No flame is ever seen issuing (showing perfect combustion) from which fact I am inclined to the belief that we have been admitting an excess of air. The naked hand can be passed across the top of the flues without giving pain from heat.

We shall construct eight benches of sixes, or rather refill eight arches this Summer, in the old part of our works where there is no basement in which to construct the style of furnace here described. In replacing or refilling these eight benches we shall put in a modified form of the gas furnace. We shall go down three or four feet below the level of retort house floor with our ash-pan, and as we can connect these benches with a smoke stack 85 feet high, we will be able to make the furnaces not only generators but regenerative—utilizing the heat of the waste gases.

I might say, in addition, after having written this paper I concluded that, in running our furnaces with such a depth of coke, we were probably overstepping ourselves a little; following out this reasoning I reduced the coke depth to three feet, and after a trial lasting eight days have had no occasion to complain of that action.

Discussion.

Mr. Cosgrove—You may have stated (but I did not notice it) a fact that I would like to inquire about. What proportion of the coke produced is used in the furnace?

Mr. McMillin—Of all that is manufactured?

Mr. Cosgrove—Yes.

Mr. McMillin—When we first started in—to avoid the question of whether the coke was measured or weighed, about which gas men appear to have different opinions—we commenced by drawing two retorts out of six, feeding into the furnace just one-third of the total quantity of coke produced, without regard to weight or measure. Of course it is understood that the same weight of coal was put into each of the six carbonizing vessels. We found that the furnace did not require that quantity of fuel; and so, in the course of our experimenting, in the attempt at regulating the proper coke supply to the furnace, and in the adjustment of the air supply, we have now arrived at the point where we use less than one quarter (without reference to weight or measure) of the entire coke product made.

Mr. Smith—What is the difference between your furnace and those of Messrs. Livesey and Somerville?

Mr. McMillin—The difference, perhaps, is this—theirs are regenerative, while mine is simply generative.

Mr. Smith—Do you find any difference in the heating conditions of your furnaces owing to, or caused by, variations of atmospheric temperature?

Mr. McMillin—No; I think not. I think that atmospheric variations are never sufficiently marked to cause such a condition of things.

Mr. Smith—I remember having heard an engineer make the assertion that such was the case—that wide variation in degrees of external air temper would affect the working of these furnaces.

Mr. McMillin—I would be inclined to charge such "affection" to the stokers rather than to the temperature of the atmosphere.

Mr. Starr—You spoke of charging your furnaces every four hours. Do you charge two or six retorts at one time.

Mr. McMillin—I made the statement simply to show that I draw three every four hours.

Mr. Thomas—Did I understand Mr. McMillin to say that he was carbonizing this coal with less than one-fourth of the coke produced?

Mr. McMillin—Yes.

Mr. Thomas—I suppose then it would be right to say, if your coke product reaches 36 bushels to the ton of coal carbonized, that carbonization is effected by the use of something less than a consumption of nine bushels.

Mr. McMillin—Yes.

Mr. Thomas—The best result obtained under working with the regenerative furnace at our Eastern plants has only approached the low figures given by Mr. McMillin. If my memory serves aright I think the best Eastern figures have been obtained either at Providence or Pawtucket. When visiting the former place, some ten days ago, Mr. Slater informed me that he was using about 30 per cent. of his coke—that 30 per cent. is by measurement. Benches built by me at the works of the Williamsburgh Gas Light Company in 1873, heated simply with the common furnace, would carbonize the coal with 30 per cent. of the coke made; and the same thing is now done there to-day. In after experiments with these furnaces with the object of endeavoring to utilize, as far as possible, all the heat in the bench, and to prevent it escaping from the chimneys (the chimneys were short, running only 6 or 7 feet above the stack), I put in tubes above the furnace doors. At first I tried a tube of three-quarters of an inch in diameter, increasing the size as I progressed with the experiment, until I got them up to a diameter of one and one-half inches. The outer ends of the pipe had a thread cut on them, and by using reducers, I could make the external opening of any diameter I desired—from one-half inch up to the full size of the pipe. In working with these tubes the best results were obtained where the outside opening was adjusted to a diameter of one inch. The admission of air in this way secured thorough combustion in the furnace, and no flame escaped from the chimney tops. The fire in the furnace bottom deadened somewhat, becoming more of a dull red, and less clinker was produced. I cannot say that under this style of working we decreased the quantity of coke used; but there is no gainsaying the fact that the heat in the bench was increased.

At the Manhattan Company's (New York city) works there is in use what might be styled a "double" furnace—*i. e.*, one extending about as much below as above the retort-house floor. The upper door in this arrangement of furnace is simply for feeding in the hot coke drawn directly from the retorts; the lower one is covered with a plate placed on a level with floor, and any additional air supply required for combustion can readily be admitted by drawing this plate back from the front. When feeding the furnace a chute is placed in the upper door, the hot coke being drawn into this and pushed through with a rake. This furnace system has enabled the Manhattan Company to do about as well as any other works; and, unless I greatly mistake, the quantity of coke used will not exceed that required for the running of many descriptions of furnaces of the regenerative class.

Col. Stedman, of Newport, R. I., has devised a furnace from which he claims to get excellent practical results. I have not yet seen it in operation; but through what I have learned from conversation with those who have inspected it, I have no doubt but that it will rank as among the best of those yet built in this country. In speaking of the percentage of coke used in firing a bench I think a wrong impression is frequently obtained from the difference in prevailing modes of expressing such percentage. It would seem to me that the fact should always be determined as to what quantity of coke will be produced per ton from the grade of coal used, in order that no confusion may arise from an ensuing comparative statement.

The question is frequently asked, and that, too, by some of those who consider themselves pretty well up in their business, if there is really any solid advantage to be gained in the employment of regenerative furnaces. I think that great benefit is to be derived from their installation. The one great obstacle that I know of to their general introduction appears to be that, in a great many cases, owing to circumstances of location, it is not practicable to go down 10 or 12 feet below the retort house floors in order to make the excavations necessary for such installations. At the new plant of the Boston (Mass.) Company the coke floor is on a level with the outside ground surface, and the retort house floor is at an elevation of 12 feet over that. Mr. Vanderpool is putting up a similarly disposed structure at Newark, N. J. In Boston it has been decided to make every preparation for regenerative furnaces, but it is not proposed to use hot coke in firing. On the other hand, those using hot coke claim an advantage of from 3 to 4 per cent. in following out the practice; and all this goes to show how great is the difference of opinion existing on a subject the relative merits or demerits of which would appear to be questions admitting readily of speedy solution.

Mr. McMillin—I did not present this paper with the expectation that it would show better results than those obtained by other gentlemen working in the same direction. In fact, I am rather surprised by the statement made by Mr. Thomas. I did not think I had gotten anywhere near to what Col. Stedman had accomplished; I supposed that Col. Stedman was using about 20 per cent. of his coke.

Mr. Thomas—I did not speak particularly as to the furnace system in use at Newport.

Mr. McMillin—The old furnace spoken of by Mr. Thomas is practically the one I have spoken of in my paper—not as to depth, but the working of both would appear to be pretty nearly the same.

Mr. Smith—I am heartily glad that our friend McMillin has been so succesful in this respect. I would like to ask Mr. Somerville what his experience has been in regard to regenerator furnaces.

Mr. Somerville—I am sorry to say that I cannot give any detailed particulars concerning this question, my time having been so taken up with other matters. In a general way I can state that I am very much pleased with what has thus far been accomplished at my works in regard to improved methods of firing.

[Messrs. Watts, Burtis, and other gentlemen still further debated the question. When the Vice-President announced that no more queries would be asked, Mr. Gimper moved that the thanks of the Association be tendered to Mr. McMillin for his interesting communication. The motion was carried, and an adjournment was ordered, the members agreeing to reconvene at 3 o'clock P.M.

[To be continued.]

ADOPTING THE WESTINGHOUSE ENGINE.—The Equitable Gas Light Company, of New York city, has decided to adopt the Westinghouse engine for driving the exhausters; this company is now putting in three (9″×9″) for that purpose.

The Deseronto Sawdust Gas Process.

By Geo. Walker.

A lengthy discussion of all the points at issue between Mr. Bicknell and myself would not, I think, be of any special interest to your readers; but, as it appears to me, there are some erroneous statements contained in his article, published in your issue of July 16th, correction of which, more particularly in view of the meagerness of available information in printed form appertaining to the subject of the destructive distillation of wood, may possibly be of interest to gas producers.

In my process for producing sawdust gas I do not manufacture residual products at the expense of either the quantity or quality of the gas, my primary object being, in common with coal gas manufacturers, to so conduct the process as to produce the largest quantity gas consistent with greatest illuminating power, and, at the same time accepting and utilizing any bye-products which may be evolved simultaneously with the operation of gas production.

It has been an objective point of my experiments to ascertain the temperature requisite to accomplish this purpose; and, as a result of these experiments, I have found that in the case of dry wood, 1,500° F. is about the correct degree of heat to be applied. Any great deviation above or below this figure causes a serious diminution in the illuminating power of the gas; although at higher heats the quantity of gas produced is largely increased.

When I stated that a 15 candle gas was sufficient for practical purposes I made the assertion advisedly; for I found, on a reference to such authorities as were at my disposal, that the average illuminating power of the gas furnished from the works of about 300 coal gas companies, in various parts of the United States, does not much exceed 14 candles. I think there must be some error in the statement made by Mr. Bicknell, when claiming that he produces 12 to 15 candle gas from sawdust carbonized at a temperature of 1,000° F., as my experience of 15 years in the distillation of wood, and the authority of no less eminent a chemist than Gmelin, would decidedly negative its correctness. The ordinary process of the distillation of wood is carried on at a temperature ranging from 750° to 1,000° F., and the gases produced, which are usually consumed in the retort furnace as fuel to aid in carrying on the operation of distillation, have very little illuminating power.

Gmelin says that the gases evolved in the ordinary process of the distillation of wood consist almost exclusively of carbonic acid, carbonic oxide, marsh gas, and hydrogen; but if the process be carried on at higher temperatures, as for the production of illuminating gas, hydrocarbons, produced at the expense of the tar, make their appearance, and if the temperature be still further raised then pure hydrogen predominates. Furthermore, as the volatile products evolved from wood by destructive distillation contain at least 75 per cent. of water, and constitute 40 per cent. of the entire weight of the wood carbonized, it is evident that, in order to convert all the volatile products into fixed gases, a temperature sufficient to decompose water must be employed—a temperature which is about twice as great as that stated by Mr. Bicknell to be the one under which he works.

It also seems strange, if all the residual products (including also the water contained in the wet sawdust) are, by Mr. Bicknell's methods, converted into a permanent vaporous condition, that he does not obtain a larger yield of gas—for, according to his own statement, the quantity of gas he produces from a given weight of sawdust, when decomposing all the volatile products, and adding thereto the gas evolved from three gallons of oil per 1,000 cubic feet of sawdust gas, does not exceed the quantity I obtain from an equivalent weight of dry sawdust, while at the same time I also get considerable quantities of acetic acid, tar, etc.

According to my reading of the early history of gas making, attempts were frequently made by the pioneer gas engineers looking to the carbonization in a given time of large quantities of coal in vessels of various shapes. The experience of these investigators in this direction led them finally to adopt the present system as the one best suited to the end in view. I hope that I shall not be adjudged an egotist when I say that my own experience has led me to the conviction that the nearer the carbonization of wood, either for gas making or for the production of acetic acid, tar, etc., approximates to the best modern system for carbonizing coal the more satisfactory will be the results.

In regard to the capacity of my apparatus for the production of sawdust gas, that will solely depend upon the number of retorts employed; and as the process of charging them with sawdust, as also the process of discharging the residual products, is almost entirely automatic, any increase in the number of carbonizing vessels does not necessitate a proportionate advance in the amount of additional labor required for handling them.

The Promises Given by Messrs. Sherman and Lemaire.

A correspondent forwards us the following as "specimen bricks" of what Messrs. B. F. Sherman and L. E. Lemaire agree to perform in consideration of their being granted the privilege of operating a gas plant at New Orleans, La.:

1st. They will furnish a bond in $20,000 not to combine, directly or indirectly, with any other gas company.

2d. To deposit with the City Treasurer $100,000 of New Orleans bonds as a guarantee that the works will be in operation in 18 months.

3d. Within four months to pay into the city treasury $50,000 for public improvements.

4th. They will pay the salary of one street inspector and one inspector of meters, both officials to be appointed by the Mayor of the city.

5th. They will make and sell gas of 20-cande power, which gas shall not contain over 10 per cent. of carbonic oxide. Price to private consumers to be $1.50 per thousand cubic feet; to the city, $1 per thousand.

6th. They shall supply certain hospitals with gas free of charge.

The Advantages of a Uniform Standard for the Sale of Residual Products.

By F. C. Humphrys, of Ilkeston.

[The following is a reproduction of a paper read by the author before the Twenty-first Annual Meeting of the British Gas Institute. We reprint it from the columns of the *Journal of Gas Lighting*.]

In order to be complete, it is very necessary to consider the subject of this paper apart from its special connection with the gas interests—that is, of course, as far as regards weights and measures; and to argue that a uniform standard is much to be desired for the sale of all products, and hence for the sale of residuals. Also to notice that all the anomalies which exist now, and have existed to a greater extent in the past, have sprung from the want of an official and scientific uniform standard; the place of the latter being filled by a varying local standard, brought into existence by the exigencies of each trade, and gradually ripening into a custom. Given, then, the admission of an existing evil, and a general desire for a change, it becomes necessary for the members of each profession to consider whether they cannot lessen the number of standards within their range of practice; so doing away with the acknowedged inconsistencies, and preparing the way for a national uniformity. The exclusiveness (well known within the memory of living man) which characterized professionalism, rendered this task impossible at one period, even had there been a desire for it. But times are now very much altered. Each profession has its technical college, or at least its institute; and it is a matter of very little difficulty to ascertain the ruling opinions on any question. With respect to this matter, all that is wanting is that each scientific body should express a clear and decided opinion as to the desirability of uniform standards for weights and measures; and it might then be found that, without a millenium or a revolution, it would be possible to bring into practice either a metric system or something on the same basis, and follow it up by a decimal system of coinage. It is late in the day to point out the advantages of either the one or the other; but, as they are both at present still far removed from the "region of practical politics," I propose to take them only as the text of what follows.

I remarked just now that it was necessary to take cognizance of the general principles of commerce as a system, in order to arrive at the proper standard by which to sell our coke and tar. In the earliest days trade consisted of an interchange of a commodity which one community had in excess for one of which it was in need. Palestine was "a land flowing with milk and honey," and possessed vines and fig trees in rich profusion. Hence the inhabitants had a natural excess of fruits and wines, which, unless otherwise provided for, would simply have been wasted. The country of Egypt—short of rain and subject to periodical floods—was unfitted for fruits, but most prolific in grain and gourds. An interchange of these commodities soon ripened into an extensive trade, which was joined in and perfected by the Phœnicians. Their "purple and fine linen" found a ready market amongst the ladies of the Egyptian Court, whilst the Chalybon wine was of such repute, and in such request for their revelries, that a jar of it would be worth many loads of corn. The Phœnicians are credited with being the first users of coined money. Be this as it may, money, as a sign of actual and personal wealth (and thus occupying the important position that it now does in all commercial pursuits), was a creation of a much later date. The trade which centered itself in Barcelona, and led to the establishment—in 1401—of private merchants' banks, gave the first stimulus which has resulted in the formation and development of the modern money market.

The foregoing is a rapid glance at the origin of commerce, which, in England, was under a cloud till very recent times. Hampered by exacting and often tyrannous laws, by feudal customs, or the curse of villenage, the vast resources and hidden wealth of Britain were unsought for and unknown; and any trade at all was simply a small interchange of food-stuffs necessary to balance the production of each district. Thus each county, and even each town of any importance, set up its own standard measure (as it gradu-

ally dawned on the rulers that some such standard was necessary), without any attempt being made at uniformity; and inasmuch as weights and scales naturally required some skill in construction, and some technical knowledge for their adjustment, measures were the rule and weights the exception. The latter, indeed, were almost exclusively confined to doctors and learned societies.

A general study of this question will soon convince the student that simplicity and uniformity are the immediate companions of civilization; and all the varied measures to which I have referred proved themselves of old, and do prove themselves even in the present day, to be a fruitful hindrance to all commerce and trade. Given a uniform international system of weights and measures, an equal unit of exchange, and provided these were moulded after the metric and decimal systems, trade with distant countries would at once become easy and simple, while wholesale operations could be carried on with the same accuracy and rapidity that single ounces, pounds, or tons are now disposed of. The great difficulty in the way is the inherent veneration of a true-borne Briton for anything antiquated, and the instinctive dread he has that, seeking to escape "the ills we have," we may "fly to others that we know not of."

Happening, a short time since, to come across a "Guide to Commercial Life," published in 1739, I found, amongst other matter, a large number of local weights and measures of the same name, but all differing in value. Unfortunately, even to-day (the various acts of Parliament notwithstanding) the following list is still sometimes used in the several industries to which it refers:—A stone (legally 14 pounds) is, of glass, 5 lbs.; meat—in London 14 lbs., in the country 8 lbs.; hemp, 32 lbs.; cheese, 16 lbs.; ginger, 5 lbs.; wire, 8 lbs. A bushel (80 lbs.) is, of barley, 50 lbs.; oats, 40 lbs.; coke, 45 lbs.; common salt, 56 lbs.; rock salt, 65 lbs.; whilst a "strike" means 56 lbs., 112 lbs., or 224 lbs. each of coke, according to the district. A wey of wool is in some parts 182 lbs., made up of 26 cloves of 7 lbs. each. But in Suffolk it is 256 lbs., made up of 32 cloves of 8 lbs. each; and in Essex, 336 lbs., made up of 42 cloves of 8 lbs. each. A tun of wine is 252 gallons; of ale, 216 gallons; of seed oil, 236 gallons; of other oil, 286 gallons. A pound may be either 7,000 grains or 5,760 grains, and still be a pound. Shakspeare (slightly altered) might be made to say:

"What's in a name?
A pound with any other weight would weigh the same."

And so our rude forefathers thought, as they bought and sold by a unit which meant simply just what custom accorded to it in the locality of the contract.

It must not be supposed that no steps were ever taken to mitigate this acknowledged growing evil. From the *Assisa de Ponderibus et Mensuris*, made before the reign of Edward III. (and, therefore, of uncertain date), down to the treaty of Union, no less than 56 enactments were passed bearing on weights and measures; but the whole, or nearly the whole, of them were repealed by 5 Geo. IV., cap. 74, which commences thus: "Whereas it is necessary, for the security of commerce and the good of the community, that the weights and measures be just and uniform;" and it further enacts that the standard yard of 1760 shall be the original yard, and the standard unit of length. Both this unit and that of weight—the brass pound—were damaged by the fire at the Houses of Parliament; and the act of 1878, under which we now rejoice, in its first and second schedules describes, with the utmost exactness, the originals and copies which at present regulate our weights and measures. Up to the passing of the act of 1824, the Winchester bushel—the original of which (said to have been given by King Edgar) is now in the Guildhall at Winchester, and which measured 18½ inches wide by 8 inches deep—was the generally accepted "legal" standard; and it was replaced by an imperial bushel, measuring 19½ inches from outside to outside, and heaped up in the shape of a cone at least 6 inches high. By this measure it was ordered that all coal, culm, lime, fish, potatoes, and fruit should be sold. The residual products of gas making were, naturally not included by name; but the scale that 3 heaped bushels should make a sack, and 12 sacks constitute a chaldron, soon came to be the recognized measure for coke in the trade generally.

Anyone who has taken the trouble to study the question of weights and measures in connection with some particular industry, cannot fail to have noticed the general transition which slowly but surely permeates each one of them—namely, a change from measure to weight. In the days of the old steelyard, when it was necessary to raise all weights from the ground, or when the load and the balance weighed alike, very little difference existed between the comparative advantages of weighing and measuring; but since the introduction of differential weighing machines, by which a load of 10 tons may be tested by a weight of as many pounds, sale by weight has received a stimulus which has placed it in front of its competitor. In order to measure a load of coke of 5 or 6 tons, the bushel must be filled more than 300 times; and to guarantee that 5, 10, or a score are not missed in the counting would be to place a degree of intelligence to the credit of the average British workman which the experience of most of us would contradict. I have frequently found that my own men often bring their imagination to aid their want of precision; and when I sold my coke by measure it often happened that a wagon was reported as having (say) 470 bushels in it. The man, on being brought in and questioned, would generally commence by asking to see the return, intimating his entire belief in its accuracy. When, however, he was convinced that it was simply impossible, he would qualify his assertion by saying perhaps the hundred might be wrong, but he was prepared to take his oath as to the seventy; the latter being, to his mind, eminently satisfactory. Any system, however elaborated by the use of chalk marks or tallies, is far from reliable when it depends for its success on the average laborer. But even admitting that you have filled your truck with 340 bushels of coke, and properly counted them, a still greater difficulty remains. Your customer must certainly take your word for it. He cannot get 340 bushels out of the truck, for the weight of the coke above would crush that below, and the result would be that, in appearance, there would be 15 or 20 bushels short. Should he therefore desire to check his bargain, he would naturally not be disposed, after the operation, to be pleased with it. Even if sacks are used instead of bushels, the evil is only lessened; it is not removed.

But there is a more important consideration; and that is the legal one. According to my reading of the acts of Parliament, that of 1824 clearly legalizes sale by measure of the various articles mentioned; but this was followed, no later than ten years afterward, by the 5 & 6 Will. IV., cap. 63, which overthrows the heaped bushel, and states (sec. 9) that all coals, slack, culm, and cannel shall be sold by weight, and not by measure; and surely coke is here implied. The act 41 & 42 Vict., cap. 49, in a saving clause (the 16th) leagalizes "stricken" measure; but no stretch of the imagination can include coke therein. The evident intention of the Legislature is this: "Sell all you can by weight; and what you really cannot sell by weight, you must, of necessity, sell by measure." "True," some may say; "that is just our position. We admit that sale of coke by weight would remove many difficulties under which we now groan; but how about the water in the coke?" Much has been written lately on this point, and from it I gather that the general belief is that coke absorbs from 20 to 25 per cent. of water; but my experience (the result of not a few experiments) proves that this is not the truth, and is beyond the truth. Not the truth, because it may be that my coke—as the proverb says with reference to the heads of the men of Devonshire who raise the coal—is of denser texture than any other; but 17 per cent. is the largest amount I have ever found in coke when weighed directly after water had been added to it. It is beyond the truth, because, even granting that a sample of coke was saturated with 25 per cent. of water, and was in the open air and subject to atmospheric changes, the very moment you ceased adding water the coke would commence to part with it, till within perhaps 48 hours or less it would come again to its normal condition.

The following tests were made with a view to see how much water the coke would take up; the coke being fresh drawn, and brought out and weighed before being quenched, so that the conditions are much more extreme than could ever exist in actual working. I have designedly confined my attention to small samples, as I could have them weighed under my own eye, and without trusting to the intelligence of my men. I must confess to reading with some amount of envy of the engineer who had "very carefully" weighed some 2,000 bushels of coke. In my yard the result of such an experiment would be doubtful.

Fresh Coke.	Added Water.	Weight in Half an Hour.	More Water Added.	Weight in Half an Hour.	Weight in Two Days.	Increase.	
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	per ct.
392	80	449	60	455	399	7 or	1.70
392	80	456	60	457	402	10 or	2.50
392	80	447	60	450	395	3 or	0.76
400	80	450	60	446	403	3 or	0.75
400	80	458	60	470	400	..	....
400	80	460	60	466	404	4 or	1.00

In this experiment the average addition of moisture in any form would only be 0.94 per cent.; whereas coke, which is usually sold at 21 cwts. to the ton, admits of a margin of 5 per cent. So that the gas manager may return to his weary couch unattended with a night-mare of a huge coke-heap, supplemented by a board bearing upon it: "All coke sold here is mixed." In another experiment 50 lbs. of coke were taken from the heap and dried thoroughly in an oven, so that all the volatile matter was driven off. After being taken out, the samples were again weighed; and on remaining a day or two weighed a third time. It was then proved that they returned to almost their original weight.

The fact is that the atmospheric changes—the "bugbear moisture"—only affect a very small portion of the heap. A day or two ago a truckload of coke, weighing 5 tons 11 cwt., was placed on the weighbridge, and remained close to it for some hours. It rained incessantly during this period, and I was anxious to see what additional weight was added. When put on the machine, including the water in the coke and that absorbed by the wagon

itself, the weight was not quite 5 tons 11 cwt. 2 qrs. As a concluding proof, it would be natural to suppose that if coke were actually subject to all those changes, we should find a great difference between old and new coke filled into the same trucks. One of my customers has had three trucks regularly from time to time during the last six months; and as they are chiefly for the depots in the London market, I have reason to believe that they have been checked at the other end. A difference of 25 per cent. would alter these by at least a ton; and yet we find the net weights have been—

No. 1.		No. 2.		No. 3.	
Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
5	13	5	16	5	14
5	13	5	17	5	12
5	16	5	14	5	13
5	11	5	17	5	13
5	13	5	16	5	12
5	11	5	12	—	
5	12	5	14	—	
5	11	5	12	—	
—		5	12	—	
—		5	15	—	
—		5	11	—	

Mean difference of No. 1..... 5 cwt., or about 4 per cent.
" " " 2..... 6 " " 5 "
" " " 3..... 2 " " 2 "

It does not follow that each time the wagon came it was always loaded alike; but it proves, at least, that there is no such thing as 20 per cent. of water in commercial coke.

The evident advantages of sale by weight are so generally apparent that it is almost a waste of time to repeat them. I may say for myself that I have never regretted having made the change some three or four years ago; and on no consideration would I return to the tedious, incorrect, and illegal system of selling coke by measure.

Coke, however, is only one of our residuals. Tar and ammoniacal liquor would still perpetuate the measure of capacity in a gas-yard, and do what I think I have shown is unwise—that is, cause us to have two scales where one would do. He is said to be a benefactor to his race who makes two blades of grass grow where previously one only grew; but what of him who, in place of many confusing systems, substitutes one of harmony and uniformity? The same reasons which led me to sell my coke by weight have influenced me with regard to tar. It is, therefore, needless to repeat them. Large quantities of tar and liquor have for some time been sold by weight; and I, propose to substitute the following scale for 4d. a gallon—the price which has been obtained up till now:

1 ton	£3	6	8
10 cwt	1	13	4
5 "	0	16	8
3 "	0	10	0
1 "	0	3	4
56 lbs	0	1	8
1 qr	0	0	10
10 lbs. to 7 lbs.	0	0	4
7 " 5 "	0	0	3
5 " 3 "	0	0	2
3 " and under	0	0	1

Example:—Net weight of tar, 1 cwt. 3 qrs. 18 lbs. = 6s. 6d.

I admit a difficulty in the way of calculation; or, at least, the present plan is not so easy as the past was. But against this I submit that we are making a change in view of the possible, if not probable introduction of an altered coinage; and that the very difficulties now noticed arise from an unscientific standard more than from anything else. And against this it may be said still further, that the ease with which 60 or 100 gallons of tar may be loaded and weighed would compensate for any slight additional calculation, which, with singular appropriateness, is transferred from the yard to the office.

So far I have been practical. A word of theory in conclusion. The metric system, although legalized by the act of 1878 is unpopular, and progresses slowly. Would it not be possible to make way for it, or remove even the need for it, by making one pound the unit, as it is now; the stone, 10 lbs.; the hundred weight, 100 lbs.; and the ton, 1,000 lbs.? When once such a system came into use, the only exclamation would be, "Why was it not introduced before?"

Discussion.

Mr. G. Livesey remarked that he had already said, in the *Journal of Gas Lighting*, all he could say on the subject of the paper. Having tried both systems—sale by weight and sale by measure—he had no hesitation in recommending sale by weight. He was satisfied that this was the right system; and, sooner or later it would become universal. He had no doubt that circumstances would very rapidly tend in this direction. He believed that in the North of England tar was universally sold by the ton, with general satisfaction. The difficulty of selling liquor by weight arose from the fact that they did not sell water but ammonia; and they would have to complicate the matter by saying, not so much per ton, but so much for the ammonia contained in a ton of water. If, however, it could be done advantageously, he should have no hesitation in using his influence to secure the adoption of one uniform system for the sale of all products. Mr. Humphrys had proved again that the idea about water in coke was really a bugbear; and there was no practical difficulty whatever in selling by weight, with regard to the water which the coke was supposed to absorb from the rain or from watering. When coke was wetted, it immediately began to part with its moisture. Coke was what might be described as a hygrometric substance; it easily absorbed moisture, and readily and rapidly parted with it.

Mr. H. A. Hill (Wallasey) said he came from the North of England, and sold all his residuals by weight. It was the custom some time ago to sell ammonia by measure (so many gallons to the ton); and he did not see why this should not be done. He thought the selling of tar in small quantities by weight was the most difficult thing to carry out. A man who wanted to tar his palings would not at all know how many pounds he wanted.

Mr. Humphrys in reply, said it had for some time been his practice to sell ammoniacal liquor by weight. It was sold according to its strength. He did not think the difficulty would be very great in selling tar by weight instead of by measure. After he had changed from selling coke by measure to selling it by weight, people still came and asked for a "strike" or a "quarter." For a strike they received 56 lbs., and for a quarter they had 2½ cwt. It would be about the same if they came for their gallon of tar. It would average about 10 lbs. to the gallon. The advantage of a uniform standard would be very great.

The president said he was somewhat disappointed that the paper had not elicited a more animated discussion. The subject was a very important one; and it had been agitating the minds of gas managers for some time. He had always been in the habit of selling coke by measure; and he had not yet seen the desirability of departing from the practice. In fact, he had sometimes considered that if gas managers were to adopt the system of selling by weight they would, in very many instances, take a certain measure and assume it to be a weight, in order to save expense and delay, more particularly in loading barges.

SPECIAL ENGLISH CORRESPONDENCE.

Communicated by Norton H. Humphrys.

Newcastle, July 10, 1884.

Writing my last monthly letter on the eve of the meeting of the Gas Institute, my thoughts naturally recurred to that event; and now that this great annual gathering of the gas engineers from all parts of the United Kingdom has once more come and gone, and we have had a few weeks in which to reflect over the proceedings, the London meeting of 1884 can be referred to as an event of the past. It was a good average meeting. The attendance was good, and although the discussions that followed some of the papers were rather flat and spiritless, and conspicuously lacking in respect to the animation observable at the earlier meetings of the British Association of Gas Managers—with one exception, to which reference will presently be made—there was an evident interest on the part of the audience throughout the whole of the proceedings. No decision was arrived at as to the proposed alterations of the rules, the principal features of which were pointed out last month. A lengthy discussion took place on the subject, but a spirit of caution seemed to be predominant—perhaps on account of the Birmingham experiences; and a resolution to the effect that "the proposed alteration of rules be referred back to the Council for reconsideration until the next annual meeting" was carried by a large majority. No distinct opposition to the propositions of the council was evidenced; but there appeared to be a general wish for more time and opportunity of talking over the matters in question before arriving at a final decision upon them.

In commenting on the titles of the papers I remarked that they presented no special novelty; but hearing them, and reading the report of the transactions, it is necessary to partly correct this assertion by drawing attention to a few points that are decidedly novel. The additional information on the subject of photometry, relating to the important matter of the quantity of light given out by a certain sample of gas as compared with the rate of consumption, comprised in the paper by Messrs. Hartley and Heisch, certainly comes under this heading.

Then there is Mr. Booer's successful discovery of a new application for gas, viz., to the heating of baker's ovens. Mr. Valon gave an account of his experiences with gaseous fuel, which excited a lively discussion. In the course of a vigorous reply he floored his opponents—for the time being at any rate—by stating his views on the subject of regeneration, and show-

ing that the amount of heat remaining to be saved from a generator furnace is practically insignificant. At least this appears to be the gist of a speech which, having to be condensed and hurriedly delivered on account of the time for closing the meeting having been exceeded, was rather rambling and disconnected, and contained references to theoretical calculations and practical experiments in a manner which left some doubt in the hearer's mind as to the actual points insisted on. Mr. Harley, exhibited and described a "calorimeter" designed by himself for ascertaining the heating power of gas. It is based on the principle of burning the gas in such a manner as to impart the whole of the heat given off to a quantity of water, and the means by which this result is absolutely secured are most creditable to the ingenuity of the inventor. A description of this elegant instrument would occupy too much space, so it would suffice to say that it may be used by any individual of ordinary intelligence, no special manipulative skill or calculative power being required. With the increasing application of the heating powers of coal gas, the need for an appliance of this nature is continually becoming more and more apparent. Another ingenious practical application of scientific principles, was the "Improved Pressure Register," exhibited by Messrs. W. & B. Cowan. This is an improvement on the well known tell-tale pressure indicator, which it resembles in so far that it comprises a clock, and a cylinder revolving once in 24 hours. Here, however, the resemblance ceases, the aid of photography being called in to take the place of the float, rod, and pencil. A sheet of sensitized paper ruled in the usual way for pressure and time, is placed upon the cylinder or drum, and the whole is covered by an outer cylinder, in which there is a long narrow slit. No light can reach the sensitized paper except through this slit, and close in front of it a glass gauge tube is fixed. The whole length of the slit is covered by an opaque glass float contained in this gauge tube, and in the float there is a small hole through which light travels to the sensitized paper. The "zero" of the float having been arranged to correspond with that of the paper, it is obvious that as the latter revolves the level of the float in the pressure gauge will be photographed; and that when the paper is submitted to the usual photographic process of developing and fixing, it will show as a thick black line similar to the line made by the pencil in the ordinary apparatus. The apparatus is so compact as to be readily portable, and its excellent finish was a matter of general remark.

An exhibition of gas apparatus was arranged by some London firms (Messrs. George Glover & Co., H. and C. Davis & Co., J. Strode & Co.) which, besides the principal specialties manufactured by these gentlemen, comprised exhibits contributed by several other makers. Admission was free by invitation ticket, and as it was held in the Westminster Aquarium, in the close vicinity of the place of meeting, and as an elegant luncheon was served each day there were plenty of visitors. A dry meter for 200 lights, manufactured by the first named firm, was shown in action measuring the gas supplied to a single small burner. It was evidently intended as a practical refutation of the opinion generally prevailing, that dry meters will allow very small quantities of gas to pass without registering the same.

But we pass to other things. Reductions in the price of gas continue to be made, as occasion permits. The experiences of the last few years fully illustrate the wisdom of cheap gas as increasing the demand, and especially as leading to its increased application in connection with industrial processes, which cannot but have the effect of consolidating and rendering more secure the property invested in gas undertakings. The various uses to which gas is applied are so numerous that it has become quite one of the necessaries of the age. The market value of gas stock is well maintained, and I notice that very good prices are always obtained whenever parcels of gas stock, whether small or large, come under the hammer of the auctioneer. As instances of cheap gas in the provinces, reference may be made to Plymouth and Bath. At the former town a reduction of one penny per 1,000 cubic feet, from 1s. 11d. to 1s. 10d. (46 to 44 cents) is to be made at Michaelmas; and the gas company at Bath have announced a reduction of 3d. per 1,000 cubic feet, from 2s. 6d. to 2s. 3d. (60 to 54 cents), and the public lights are to be supplied at the rate of 1s. 11d. (46 cents) per 1,000 cubic feet.

We in England, have a common proverb, which I believe exists in one form or another in most other countries. In one case an expression for pointing out the folly of sending any particular kind of merchandise to a neighborhood where it is already plentiful, is "that is carrying coals to Newcastle." Yet something which at first sight appears to be capable of bearing a similar interpretation has been done by the Liverpool Gas Company. Although situated in the neighborhood of large cannel coal mines, this company has just received a cargo of Australian cannel. The arrival of this consignment has naturally created some excitement among local traders, who perceive a new rival to their already very quiet trade. It appears that this Australian cannel, which is found in large quantities in the neighborhood of Sydney, New South Wales, is extraordinarily rich as regards gas producing qualities, being quite equal to the celebrated Boghead cannel. And if the reports as to its quality are substantiated in practice, and it can be landed in this country at a price that will compete with home cannels, it is probable that other gas companies will be tempted to try it. A demand may also spring up for it, as a source of paraffin and other hydrocarbons. Some years ago an attempt was made to introduce it in London, but it was then found that it could not compete with English coal in the matter of price. This Australian cannel is said to be so plentiful that the price obtainable on the spot is low, and hence the endeavor to find a foreign market for it. Talking about coal, there is a big strike now on in Staffordshire, some 16,000 miners having left work. So many conflicting rumors get into circulation that it is difficult to get at the real facts connected with these strikes. Last autumn there were alarming rumors of probable strikes to take place toward the end of the year, and many gas companies were thereby induced to lay in stocks of coal at 1s. and even 2s. per ton advance on the current prices. It is probable that astute coal factors are able to derive some little advantage out of these rumors.

Another installation of the electric light, both for public lamps and private consumers, is announced as having just taken place at Colchester. Of course it is under a fresh title, since, for some reason or other, I will not say for obvious reasons, the light of the future appears to undergo a re-christening process almost for each fresh installation. The system adopted at Colchester is called the B. T. K. system, and this by no means euphonious title is derived from the initial letters of gentlemen connected with the promoting company. The trumpeting and show which accompanies the entrance of these electric light installations, presents a marked contrast to the quiet manner in which the exit is made. A great deal was said—I suppose there was not a newspaper published which did not contain at least one paragraph on the subject—about the wonders to be done with the electric light at Chesterfield, and Godalming; but at both these towns the much abused gas has displaced the would-be-rival, and the electric light has silently slunk away and departed, without any champagne luncheons or sumptuous dinners, and the panegyrics in the daily papers which very often follow these convivial meetings—without any visits from lighting committees and important men from neighboring towns, or men of high scientific position and sufficient standing to affect the share market by a judiciously worded sentence. Why do not some of the friends who so enthusiastically applaud the electric light at the commencement of its career, come forward to sympathize with it when it is declared a failure and forced to retire? The trial of the Edison light is not proceeding very satisfactorily on the Holborn embankment in London; it has been discontinued at intervals lately, and rumor says it is likely to be stopped altogether. One of the places included in this installation is a large place of worship known as the "City Temple;" but a friend who recently attended there informs me that the electric lamps have now been removed and that the building is lit by gas. And no wonder. For according to report the electric light has not always shown that respect for the preacher which decency demands, and the eloquence of the reverend gentleman on the rostrum has been rudely broken in upon by lamps "going out" or "bursting." The electric light is largely used for lighting the Health Exhibition at South Kensington, (the same set of buildings that were used for the "Fisheries Exhibition" last year) but whether it is paid for at a rate that affords the suppliers a fair trading profit is another thing. It has not displaced gas, for that is also used in all parts of the buildings, and is therefore ready at hand in case of any emergency.

A firm comprising three gentlemen, well known in London gas circles, has recently commenced business as Gas, Water, and Sanitary Engineers, and intends to give special attention to gas consumers grievances, by supplying the best appliances in the way of burners, regulators, lanterns, etc., for the economical use of gas. I have often wondered why this subject has not received more attention. Surely in every large town there is room for at least one firm who might make economy of gas and the remedying of the large amount of waste—larger, perhaps, than would be at first sight supposed, which in one form or another goes on amongst gas consumers—a speciality. But few gasfitters give that degree of attention to "economy of gas consumption" which its importance demands. If the sellers of gas endeavor to do anything in the way of advising the consumer, their labors in this direction are looked upon with a certain amount of prejudice. So there is a need for a competent independent party, whom the consumer can call in when, on account of the gas mains being enlarged, or the pressure being increased to meet an increased demand, or the several other causes that frequently occur in practice, he finds his gas bill increased and is at a loss to account for it.

THE ELECTRIC LIGHTS GO OUT.—Toronto, Canada, is now enjoying (?) the benefits of a trial of the arc system of street lighting. The lights on King and Queen streets, both prominent thoroughfares, on the evening of July 3d went out, and, to the disgust of the people, "staid out" for the entire night. Surely, the Torontonians will not mind a little thing like that. New Yorkers only have food for wonderment when the "moons" remain lighted throughout the allotted period.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

New Coal Gas Plant of the Crawfordsville (Ind.) Gas Light Company.—The people of the town of Crawfordsville, Ind., had for some time back been supplied with an illuminant consisting of a mixture of oil gas and air. The varying quality of the light afforded under the plan employed was the subject of much complaint and annoyance, and the upshot of the "unpleasantness" was that the Crawfordsville Gas Light Company decided to put an end to the murmurings by the erection of a thoroughly equipped coal gas plant. The services of Mr. James Somerville, of Indianapolis, Ind., were called into requisition, and that gentleman was instructed to design and construct a works having a calculated capacity of 100,000 cubic feet per diem. With the details of construction placed in such efficient hands, but one result could ensue; and now Crawfordsville possesses a works fully up to the task of supplying a first-rate article of coal gas instead of the nondescript illuminating vehicle which occasioned the complaints spoken of at the commencement of this note. The following brief description will give some idea as to how the plant is arranged: The retort house is 30′ × 38′, and contains four benches of sixes; under the same roof, but separated from the retort system by a 9-inch brick wall, is located the exhauster and boiler room, the inside dimensions of the compartment being 12′ × 30′. A chimney, carried 10 feet above the roof, carries off the products of combustion from the benches and boiler. The purifying house is 24′ × 30′, and contains a set of 8′ × 8′ × 3′ purifiers, furnished with dry center valve. The condensers and scrubbers are also in this building. Next in sequence comes the workshop, 18′ × 24′. The office, meter room, and showrooms front directly on the street line; indeed, a more complete distribution and disposition of the various buildings could not be made. The Stacey Manufacturing Company furnished the iron work; Evens & Howard the retorts, as well as other fire-clay goods; P. H. & F. M. Roots the exhauster and engine; and the American Meter Company the station meter. Now, we hope that the gentlemen connected with the management of the Crawfordsville Company will reap the reward of their enterprise and liberality in so promptly recognizing the necessity of furnishing their fellow-citizens with a stable, pure, and cheap illuminant.

Something from Pawtucket, R. I.—Brother Stiness, of the Pawtucket (R. I.) Gas Company, is up and doing. This will not be likely to astonish his coadjutors in the gas business, as he usually keeps in the front rank anyhow. The wisdom of extending his plant and increasing his working arrangements was quite apparent some time before the work was accomplished; but now he has a large job on hand—and one he could not have undertaken were it not for these very improvements. On the 14th of July work was commenced on the laying of 12,000 feet of 12-inch mains to run from the Central Falls holder of the Pawtucket Company and terminate at the No. 4 mill of the Lonsdale Manufacturing Company. The Lonsdale Company will erect a building and install therein a station meter, exhauster, and engine; the object of this set of apparatus being to fill the gasholder belonging to the company, and from which holder the gas supply of the mills at Berkeley and Ashton will be taken. It is more than likely that the near future will see both Albion and Manville supplied with gas from the works of the Pawtucket Company. While not positive as to the exact status of the case, we think we are safe in asserting that the Lonsdale Manufacturing Company (one of the largest print works in the United States) formerly manufactured its own gas; and, if that is the proper surmise, the importance of this new accession of business to the Pawtucket Company can be readily appreciated. This would look like a pretty good refutation of the argument advanced by the incandescent electric lighting promoters, as to the effectiveness and cheapness of isolated electric plant when applied to the illumination of large factories, mills, storehouses, etc. If isolated electric lighting methods cannot successfully compete with gas as a lighting agent in the illumination of the various departments of the Lonsdale mills, it is hard to see any situation where such competition is liable to prove injurious to the business of the American gas maker. Possibly Mr. Stiness could be induced to give us the history of how the thing came about.

The Naphtha Street Lantern.—Binghamton, N. Y., is a handsome township, and the fact that such is the case is matter for pride on the part of the inhabitants thereof. Binghamton, though, does not seem disposed to have its streets all lighted in a manner befitting the beauty and charm of its location. Now, we suppose the Binghamtonians would be displeased were they to hear themselves called stingy—not to say miserly—and foolish in employing naphtha street lights for the night illumination of their handsome avenues; bearing in mind the adage, "handsome is that handsome does," we would suggest that gas is likely to prove more attractive—certainly it has a "prettier" scent when "burned and not breathed"—than naphtha, and it is almost as cheap. Apart from the æsthetic conditions involved, gas is a decidedly safer medium than its frisky Binghamton competitor; and here is a page of evidence in support of the statement: At about 6:30 P.M. on the date of July 13, a lamplighter named J. C. Clark was making his nightly round of duty in lighting the naphtha street lamps under his charge. One of the reservoirs was in a leaky condition, and the fluid became ignited through contact with his torch. The poor fellow was so shockingly burned that death mercifully intervened to relieve him from his tortures. He leaves a family consisting of a wife and several children, and they are in very straitened circumstances. Suppose that these unfortunates become charges upon the poor funds of the town; would not the expense of their annual maintenance pay for many a gas-lighted lantern?

Gas versus Electricity in Lighthouses.—The experiments carried on at South Foreland, England, detailed at some length in the Journal of July 2, in regard to gas, electricity, and oil as agents for lighthouse illumination, appear to have settled the question that gas light is the one best calculated for use in decidedly hazy weather.

Reduction in Price of Gas at Easton, Pa.—At a recent meeting of the board of directors of the Easton (Pa.) Gas Light Company, it was ordered that an extra discount of 10 per cent. be allowed on all bills for gas consumed in Easton on and after August 1st. The old rate was $2.50 per thousand cubic feet, subject to a discount of 10 per cent. The additional discount granted consequently brings the new net price down to $2 per thousand. When the area of the field for gas distribution covered by the Easton Company is considered, and due attention is paid to the geographical situation of the place, showing that its coal must come at a fairly high figure, we think all will agree in saying that the new gas price is a low one. President Boilean, ably assisted by Superintendent Hoyt, has been watchful and zealous in promoting the best interests of the property under his charge; and both these gentlemen are to be congratulated on the fact that they are working in the right direction. Their success may serve to point out a moral to their more cautious and less venturesome brethren; this moral we have told over and over again—keep your plant right up to the mark, and deal with your consumers in a liberal, fair-minded manner; most important of all, fix and pay a fair profit upon the capital invested in the property, and should you be able to earn a greater sum than that fixed and fair profit, let your consumers share your prosperity through a reduction in selling prices. It would be well for some of the companies, not so very far away from Easton, if they would follow the excellent example set before them.

Good Practice for New York's Policemen.—The blue-coated members of New York city's police force are very fond of using their locust batons, and seldom miss an opportunity for bringing them into play. So many instances of indiscriminate clubbing have recently transpired that many of the blue-coats have been brought to grief. But something must be clubbed, you know; and as it is no longer perfectly safe to club the citizen, the guardian of the piece has hit upon a happy substitute. This is about the nature of the substitute: Two gentlemen, while strolling through City Hall Park early one night last week, observed a policeman pounding away on an electric light pole. "Well," said one of the strollers to his companion, "the police should have no occasion to use their clubs on people while they have so much chance to practice on these poles." "You see," replied the one interrogated, "when the current is turned on the carbon points sometimes fail to come close enough together, and therefore there is no light. Then the observant officer, noting the state of affairs, raps the pole smartly, and the carbons are jarred into place. It is good practice for the policemen." We have had "electric girls" in New York (as witness the "Georgia wonder"), whose particular faculty consisted in making certain articles dance; but now we are to have electrically expert policemen. Are we to conclude that the policemen are electrically inclined owing to their quickness at "stunning" people?

It is Just the Same Everywhere.—A company of speculators recently bought the right to light the town of Tiffin, Ohio, with the incandescent electric system of the Edison company. Of course it is understood that buying the light, and then getting the lighting of the town to do, are widely different things; a great many electric lighting promoters have found that out lately. However, the Tiffin electricians went to work and set up their plant, the canvasing for customers going on bravely in the meanwhile. Among the more recent customers was a Mr. Naylor, the proprietor of a hardware shop, whose premises were being wired on a certain date. The workmen had gotten the wires in, and all properly connected, but a few minor details remained to be completed before the installation service would be finished. These finishing touches, owing to the lateness of the hour, were deferred until the next day—the workmen, as usual, quitting at six o'clock P.M. Soon after their departure the wires, from some unexplained cause, came in contact with and set the ceiling on fire. The danger of conflagration was speedily averted by cutting the wires; but if the place had

been closed up for the night it is hard to say what would have happened in the way of damage.

ADDITIONAL WATER SUPPLY FOR BROOKLYN, N. Y.—Sixteen acres of land, in Valley Stream, Queens County, costing $5,000, and 52 acres in the vicinity of Conselyea's Pond, costing $20,000, have been purchased by the department in charge of the Brooklyn City water works system, and the work of securing an additional daily supply of 10,000,000 gallons of water is being pushed forward as rapidly as possible. The water will be obtained under the driven well plan, and it is said that the contractors are to be paid at the rate of $36,000 for every million gallons of supply furnished.

A HALF A CENTURY OF FAITHFUL SERVICE.—Fifty years ago, on date of July 6th, 1834, Mr. Edward Jones commenced work as an apprentice with the Boston (Mass.) Gas Light Company. Step by step he has advanced to his present honorable position in the gas business, and he looks back over his record with entirely pardonable pride. The semi-centennial anniversary was appropriately observed.

REDUCING THE PRICE OF GAS AT SOUTH BEND, IND.—At a late meeting of the board of directors of the South Bend Gas Light Company, it was determined that on and after the first day of last July the price of gas should be reduced to $2.50 per thousand cubic feet—subject to the following discounts:

All consumption of less than 1,000 cubic feet, monthly..10 per cent.
" " " over 1,000 " " " ..20 "

The further provision is made that all bills must be settled for within ten days from date of rendering, or else the discounts will not apply. The South Bend folks, in announcing the reduction, plainly state that "the large increase in business, together with the largely increased facilities brought about by extensions to the plant, has enabled the company to make the concession." Think of it; the South Benders are to have gas, at the highest rate, at the price charged in New York City to all classes of consumers. The "man at the helm" of the South Bend Company shows no disposition for sleeping at his post.

FATAL ACCIDENT AT THE WORKS OF THE WILLIAMSBURGH (N. Y.) GAS LIGHT COMPANY.—Three workmen, Michael McDonough, Paul Quinlan, and an Italian whose name is unknown, in the employ of Contractor Deeves, of New York City, lost their lives, on date of July 15th, through injuries received while working in the excavation dug for the reception of a gasholder to be erected by the Williamsburgh Gas Light Company.

WHAT DOES BUFFALO (N. Y.) WANT WITH ANOTHER GAS COMPANY?—A company styling itself the Consumers Gas Company wants the Common Council of Buffalo, New York, to grant it the privilege of building a gas works and operating the same in the City of Buffalo, N. Y. The price proposed to be charged is $1.25 per thousand for "gas of excellent quality." Has not Buffalo had enough experience in this direction? Better keep them out.

A GAS WORKS DAMAGED BY FIRE.—On the afternoon of July 4th fire was discovered in the north wing of the building occupied by the Columbus (Ind.) Gas Light Company as an exhauster and meter room. The fire burned off a portion of the roof, and an explosion took place that injured the side walls so badly that they had to be torn down. The fire department were so prompt in answering the signal for assistance that the flames were prevented from gutting out the floors. None of the machinery (exhauster, station meter, etc.,). was badly damaged, whatever injury was occasioned to it being caused by water. Superintendent C. M. Keller says the origin of the fire cannot be traced out, although he thinks it was brought about by mice nibbling at matches.

INCREASING THE CAPITAL STOCK.—A certificate of increase of the capital stock of the Bellaire Gas Light and Coke Company from $50,000 to $100,000 was recently filed with the Secretary of State of Ohio.

CHEAP GAS FOR MILWAUKEE, WIS.—The board of directors of the Milwaukee Gas Light Company, at the quarterly meeting held Monday, July 7th, decided to reduce the price of gas to ordinary consumers to $1.60 per thousand cubic feet—the former rate having been $1.80 per thousand. The reduction was made to go into effect from July 1st last, and applies only to those consumers who make prompt settlements. That the Milwaukee people believe in cheap gas is borne out by the statement that this is the second reduction in price made within the last thirteen months. On July 1st, 1883, the cost to ordinary consumers was reduced from $2.00 to $1.80 per thousand, and the gas supplied to the city was lowered from $1.75 to $1.30 per thousand. In our issue of July 2d it was recorded that Mr. Charles R. Faben would sever his connection with the Milwaukee Company on August 1st—he having handed in his resignation to take effect on that date. Mr. Faben's plans of additions and extensions to the Milwaukee plant are now bearing their fruit, and he should feel that his labors have not been in vain. Mr. E. G. Cowdery will succeed to the Superintendency of the Milwaukee works. Intelligent management is bound to win—and Milwaukee does not seem to furnish much ground for inspiring hope in the minds of "striking" speculators. Keep down the price of gas, in order that the plunderers may be kept out.

PRICES OF GAS IN SOME WESTERN CITIES.—Here are some of rates for gas which at present obtain in the cities below named:

	To the City.	Ordinary Consumers.
Buffalo, New York	$1.30	$1.60
Cincinnati, Ohio	1.38	1.60
Cleveland, Ohio	1.25	1.40
Detroit, Mich	——	2.00
Indianapolis, Ind	2.00	2.00
Milwaukee, Wis	1.30	1.60
Toledo, Ohio	——	1.75

These are fair enough rates.

EXPLOSION OF GAS AT ATLANTA, GEORGIA.—The water gas people make some queer claims about "the sometimes deadly and always dangerous" explosions that take place when an explosive mixture of coal gas is ignited; then they go on to deduce the conclusion that water gas, containing a much less percentage of that "terrible" ingredient marsh gas, is so much safer than coal gas that the one should be preferred to the other for domestic use—when the question of explosion alone is considered. We will have to ask the indulgence of our readers for having in any manner reverted to these harmless stories, silly though they be; yet we did not so revert in order that it may be understood that the value (or rather the worthlessness) of them can be more readily divined by a reading of the following account of a disastrous explosion occasioned by the ignition of an explosive mixture of the water gas product manufactured by the Gate City Gas Light Company, of Atlanta, Ga. On the afternoon of July 23, two workmen, under the direction of master plumber Henry Belcher, were engaged in the operation of connecting the premises at No. 172 Decatur street with the mains of the gas company named above. The building was occupied by the owner, Mr. C. M. Barry, who carried on a grocery business. The supply pipe had been laid under the pavement, and entered the building about its center. The riser was carried up through the floor, and everything appeared to be in readiness for placing the meter in position. Before the meter was set a smell of escaping gas was noticed, and one of the workmen was instructed to go in underneath the floor beams to ascertain whether the riser-joint had been properly made. He did as instructed; but as near as can be ascertained, he brought along the never failing match to help him on his way. The match, as usual, did its duty; and the explosion that resulted was not slow in doing its deadly work. The place was actually blown into splinters (the building was a frame one), and a negro woman, who was in the store making purchases at the time, was instantly killed. A man named Madison received wounds which the doctors claim cannot prove otherwise than fatal, and five other persons were more or less injured. The amount of pecuniary damage alone is placed at a valuation of $1,500. The jury impanneled to try the case decided that "the negro woman (named Gates) came to her death through injuries received from an explosion of gas." The jurymen also asserted that "the explosion was caused by negligence on the part of the Gate City Gas Company in not having stop cocks put in its pipes at proper places." This latter part of the verdict is decidedly unfair to the gas company; but perhaps the jurymen were prejudiced against the water gas purveyors, from listening to the testimony of Mr. Holmes, the agent or superintendent of the Gate City Company. This "expert" actually tried to convince the jury that the explosion was caused by the ignition of "well damp" which had accumulated underneath the flooring. Mr. Holmes is evidently a firm believer in the marsh gas theory.

GAS WELLS TAPPED IN DAKOTA TERRITORY.—A despatch from Frankfort, Dakota Territory, says that a strong vein of natural gas was tapped there on date of July 22. Contact was made at a depth of 85 feet.

A WAIF FROM RICHMOND, VA.—The cost of the condenser and scrubber now being manufactured by Messrs Tanner & Delaney, for the gas works under control of the city authorities at Richmond, Va., will be in the neighborhood of $8,000. We are glad to learn that Messrs. Adams & Knowles are pushing things along right lively.

THE FALL AND WINTER OUTLOOK.—From all parts of the country comes the news that the gas makers expect the coming fall and winter season to be the busiest one ever experienced. The most gratifying feature in this connection, aside from the general unanimity of expression concerning the

outlook, is the fact that not alone in the larger cities and towns is this increased output looked forward to with confidence, but the smaller plants seem to be buoyed up with even greater expectations of coming gain than are the "big fellows." Do not forget that your common enemy, "the oil barrel," is also pretty convenient just at present. This advice is added for fear that some of you might think that prudence, moderation, and watchfulness are no longer absolutely necessary. The only way to keep the key to the situation is a pursuance of the happy policy that has prevailed during the past two years.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Objections to the Use of Water Gas as Fuel.

ALBANY, N. Y., July 28, 1884.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Carbonic oxide is the gas formed when carbon (either in solid or gaseous form) is burned with an insufficient supply of air. That it is a deadly poison is well known; and hence, breathing it in the form of charcoal fumes, in a close room, has been a favorite, because painless, means of committing suicide. The leading chemical text books make mention of the poisonous qualities of this gas, as amply proved by Prof. Morton's collation of excerpts on the matter, as published in the JOURNAL issues dated March 2 and 16, 1878. I might here add to the authorities then quoted the name of Prof. Wells; this author, in his work entitled "Principles of Chemistry," says (p. 295) that "carbonic oxide is much more poisonous than carbonic acid, and the inhalation of air containing one two-hundreths of it, for any considerable length of time, is said to be fatal."

The above facts being beyond dispute, the advocates of the coal gas system of manufacture claim that, as water gas contains from four to five times a larger volume of carbonic oxide than is carried in ordinary coal gas, the law should be appealed to in order that the people might be protected from exposure to an unnecessary peril. Those interested in the advancement of water gas, in reply to these charges say that, admitting carbonic oxide to be a poison, and in excess in their gas, it cannot prove injurious unless, through defective fixtures or leaky pipes, escapes occur— and even under such circumstances especially harmful results can hardly ensue, as the odor is sufficiently pungent to at once attract the attention of those exposed to the chances of its inhalation.

The water gas purveyors have been adroit enough, in their controversies with coal gas advocates, to confine their argument to the point, viz., whether, leakage being prevented, the large excess of carbonic oxide is a fatal objection to the use of water gas as an *illuminant*—entirely ignoring the effect of such excess when that product is used as a fuel in the carrying out of ordinary domestic purposes. This latter phase of the case would seem to me to be of far greater importance than the other, as in nearly all gas stoves now used in household operations the products of combustion are necessarily more or less discharged into the room, and, so far as these products consist of carbonic oxide, must poison the air therein. Carbonic oxide (unlike carbonic acid) being slightly lighter than atmospheric air, always rises to a point where it must be inhaled; and it is to make the above inquiry that this article is written.

The practice now in general use, for burning gas as fuel in the stoves sold by both coal and water gas companies, is known as the Bunsen system—simply stated, mixing air with the gas, previous to combustion, and burning them together. Its advantage lies in consuming the gas without smut, whereby the flame can be permitted to strike the cooking pan directly, its disadvantage arising from the formation of carbonic oxide in excess over the quantity that can be consumed—hence the necessity of making flue connections where a heating stove is employed, which course is now advised by all gas companies—and where that course is not possible, viz., in cooking stoves, the installation is urged to be made in places where a free circulation of air can be maintained.

Now, according to Clegg, and other eminent English authorities, to consume the carbon contained in a cubic foot of London coal gas (only about 14 candles illuminating value) requires ten cubic feet of air; a larger quantity of air being required to effect the operation as the gas increases in richness. That is, when the above quantity of air is furnished the product of combustion is carbonic acid; and just in proportion as the requisite quantity of air is not supplied the combustion product is carbonic oxide—always known from the flame being blue in color.

According to well-known experiments made in London, authenticated through exhaustive tests made by Mr. Wm. W. Goodwin, of Philadelphia, Pa., only about two cubic feet of air to one cubic foot of gas can be advantageously used, previous to ignition, from which, when that system is used, it follows—

First. That at the time of ignition the chief product of combustion must be carbonic oxide; and

Second. Unless the air mixing with said product subsequently converts it into carbonic acid (which we know is not the case—the fact being that, coming in cold currents from every side, it must chill down instead of increase the heat required for combustion), it must remain in the form of carbonic oxide, and, in that character, passes into the room.

Thus far, of course, the explanation just given of how, and why, carbonic oxide is formed and liberated, when gas is burned as a fuel in the manner above stated, applies to both coal and water gas. Leaving such explanation an open question, for the present, so far as it applies to coal gas, I think it is proven beyond dispute that, whether or not water gas can be safely used as a domestic illuminant, it should not be employed in the gas cooker or gas heater.

First. Because on account of its great richness in carbon, it must make carbonic oxide largely in excess over that from coal gas, when used as fuel; and,

Second. Because, owing to the foregoing fact, and the further fact that it is one-third carbonic oxide *before* ignition, the products of combustion, at the time of ignition, must consist not only of the carbonic oxide then formed, but also of the carbonic oxide passing from the burner unaltered, owing to the supply of air at such times being but a fraction of that required to insure complete combustion.

But it is said—assuming the above demonstration to be sound—this does not matter much, since cooking by gas is chiefly done in warm weather, when windows and doors may remain open. To this I would reply that, carbonic oxide being colorless and lighter than air, all those using gas stoves must breathe more or less of the poisonous vapor; and if it does not kill at once, neither does sewer gas—and no sane person would be inclined to inhale this noxious compound, unless compelled to do so. TRUTH.

Mr John Somerville Sets Mr. C. H. Raynor Aright.

SOUTH METROPOLITAN GAS COMPANY,
70 BANKSIDE, LONDON, ENG., July 10, 1884.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In your issue of June 16, to hand a few days ago, I noticed a letter from Mr. C. H. Raynor, of Adrian, Michigan, referring to a sketch and description of my patented "dip reducer," as published in the London *Journal of Gas Lighting* of date of May 20, 1884.

Mr Raynor appears to have mixed up the dip reducer with the tar extractor, for he says, "the object sought being the removal of tar from the hydraulic main." Now, the dip-reducer has nothing whatever to do with the removal of tar from the hydraulic main; and the writer of the description of it given in the London *Journal* made that quite clear, for he was careful to say, at the end of the description of the tar separator or extractor, "This arrangement is, of course, merely a suggestion, and does not form part of the patented dip-reducer." Accordingly, Mr. Raynor is slightly in error in saying the dip-reducer is for the removal of tar; and I should like, with your permission, to set him right about it.

The dip-reducer is a funnel-shaped appliance attached to the ordinary dip-pipe for isolating a small portion of the liquor from the large body in the main, so that, when the retort is charged, the small quantity contained in the funnel is driven out, by the pressure of the gas, in the form of spray over the edge of the funnel, which stands half an inch above the level of the liquor in the main, and so prevents its returning except through an inch hole in the lower part of the funnel, when, as it arrives in small quantity at the level of the dip pipe, it is again dispersed in spray until the retort is spent; then the liquor rises up the dip-pipe and makes the usual seal of 1½ inches, or whatever the normal seal may be.

This has the effect of reducing the pressure in the retort from 1½ inches to two-tenths during the time the retort is giving off its gas. It was designed some twelve months ago as a substitute for the anti-dips, of which I have tried several forms, both of my own designing and the inventions of others; but I have found them all troublesome and unreliable, and had to abandon them—at the same time being fully impressed with the necessity of relieving the retort of pressure, or, rather, of reducing it to a minimum. This is what the dip-reducer referred to by Mr. Raynor does, besides washing the passing gas in a spray-bath as it traverses the hydraulic main to the outlet.

In conjunction with it, it is very desirable that the arrangement should work in liquor and not in tar. In order to explain how that object can be attained, there is shown in the illustration, attached to the main, a slight modification of an apparatus we have had in use for some four or five years at these works for withdrawing the tar from the main as it is formed, thus leaving liquor only to form the seal to the dip.

Thanking you for space in your very valuable JOURNAL to allow me to make this explanation, I am yours faithfully,

JOHN SOMERVILLE.

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SATURDAY, AUGUST 2, 1884.

Wrought Iron Mains.

In discussing this subject the *Iron Age* says, "The strain upon gas mains from within is, under ordinary conditions, insignificant. If the strength of mains to resist bursting were to be carefully considered, as it must be with cast-iron water mains, the remarkable resistance of thin sheet iron would be generally recognized. The experience of Californian mining engineers is conclusive upon this point. Here it has been for 20 years customary to bring large supplies of water for hydraulic mining (now in some cases transformed into ordinary supplies for town populations) for many miles, under enormous pressures, by means of single-riveted pipes of No. 14 or 16 B.W.G., put together stove-pipe fashion, with the joints made tight by tarred strips of webbing. These pipes are frequently laid on the surface of the ground, protected in places by a couple of 1½ inch planks tacked together and laid over them, and thus they endure a range of temperature of from 10° to 107° F. in the shade. The last February number of the "Transactions" of the American Society of Civil Engineers contains an instructive paper by Mr. Hamilton Smith, Jr., on this subject. The water supply for San Francisco is brought from storage reservoirs, a distance of 15 miles, in two riveted sheet-iron pipes. As an instance of the durability of such pipes, Mr. Smith cited two pipes—laid side by side, in 1868, by a company—each 26 inches diameter, of No. 16 B.W.G. iron, single-riveted, which stand an interior tensile strain of 11,500 pounds per square inch, and, although the water running through them is sandy and gritty, the pipes are nearly as good as new. All these pipes are soaked for 15 minutes in hot asphalt before leaving the workshops.

The drift of all these facts is to prove that when circumstances call for the lightness, elasticity and adaptability of a thin sheet-iron main-pipe for gas or water—when the cost of carriage is high, when the ground is hard or liable to settlement—bitumenized sheet-iron will be strong enough, tight enough and last long enough for all practical purposes. It is not to be recommended where many tappings for services are to be expected; nor is it to be adopted merely for the sake of change, or in the absence of conditions unfavorable to the commoner type of main. For cheapness and speed of laying, the Californian style of making the pipes in 20-feet lengths very slightly taper, so as to enter each other as spigot and socket, with a wrapping of tarred or painted webbing to make all tight (the end rivets being countersunk), must bear away the palm. Surely, if pipes of this type will last for 20 years under a head of from 300 to 800 feet of water (passing, moreover, sand and gravel at tremendous velocity), they ought to stand for ordinary pressure, in a more equable climate. The subject is of great economical and technical interest and deserves to be kept in view, and regarded without prejudice on either side."

Preventing Corrosion of Iron and Steel.

According to Professor Calvert, recent practical tests made by him go to show that the carbonates of potash and soda possess the same property of protecting iron and steel from rust as do those alkalies in a caustic state. Thus it is found that, if an iron blade be immersed in a solution of either of the above carbonates, it exercises so protective an action that that portion of the iron which is exposed to the influence of the damp atmospheric air does not oxidize, even after so extended a period as two years. Similar results, it appears, have also been obtained with sea water, on adding to the same the carbonates of potash and soda in suitable proportion.

The Market for Gas Securities.

Manhattan shares have been the feature in the market for New York city gas stocks during the past fortnight, and the surprising price of $303 per $100 of par value has been paid for the security. While all the other city shares proper show a tendency to decidedly higher figures, the proportionate increase, taking Manhattan as the standard, is not borne out. The various stories floating around the "street" concerning negotiations looking to a consolidation of the New York city companies into one large corporation—with the exception of the Equitable Company, which, according to rumor, is to be left out in the cold—with a capital proportioned to the actual existing value of the properties and plants, have such a decidedly "bubbly air" about them, that we will forego their detailed statement. Manhattan, at 305, is less than a 10 per cent. stock; but, still and all, without attempting to give the inside reasons as to why the stock has advanced so rapidly in the past two months, 10 per cent. is a very neat return in the shape of annual interest. One or two brokers account for the low quotation of Equitable stock on the ground that some strong parties are offering the shares down solely in the hope that weak holders may be shaken out; or, in other words, that a certain set of capitalists are inclined to get control of the concern provided that control can be gotten at a low figure. We expect to hear "music in the air" shortly, anent the gas share market of New York city. Probably, holders will not be far out of the way if they keep a tight grasp on Manhattan, Municipal, Metropolitan and New York shares. A parcel of 118 shares of Manhattan gas, sold in three lots, brought prices all the way from 297, to 298 and 300—the last lot selling at the highest notch. The Metropolitan Company has declared a dividend of 5 per cent., payable August 12; the Harlem Company pays its regular semi-annual dividend of 3 per cent. on August 7. Central gas shows an advance of 10 points over the figure given for July 16.

Brooklyn city gas shares are fairly steady—Fulton Municipal being recorded at much higher prices. Hartford (Conn.) gas is weaker; Consolidated gas (Balt.) is stronger; Jersey City gas is lower to the extent of the dividend declared and paid July 1; Washington (D. C.) gas is fairly steady; St. Louis (Mo.) gas is lower; San Francisco (Cal.) gas shares are steady to strong. For quotations, see page 72.

HYDRAULIC MAIN WANTED.

One section second-hand 20-inch Hydraulic Main, for bench of threes, complete, with straddle-pipes. Address

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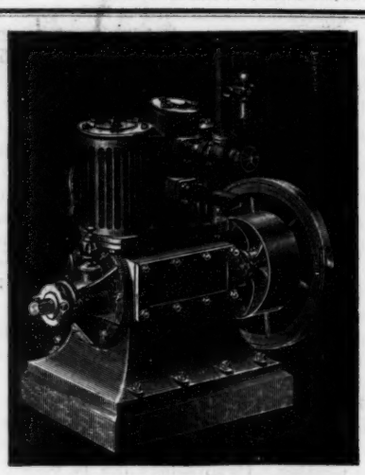

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Among the hundred and more gas works where Klonne's furnaces have been used are those in London, Salford and Birmingham. In the latter city 952 Klonne retorts *produce daily over* 9,000,000 *cubic feet of gas.* From the many flattering testimonials received by Mr. Klonne the following explains itself:

"WEISBADEN, March 26th, 1884.

"The Manager of the Gas Works, Mr. Winter, informs the Gas Engineer of the facts and results he obtained with the Klonne Regenerative Furnaces, which were constructed some years ago. Bench No. 1 in 584 days produced 131,917 cubic meters per retort; bench No. 2, in 771 days, 169,504 cubic meters; bench No. 3, in 903 days, 200,317 cubic meters; bench No. 4, in 154 days, 41,978 cubic meters; bench No. 5, in 167 days, 42,857 cubic meters. Benches 2 and 3 are still good for another season without repairs. Production, 305 cubic meters of gas per 1,000 kilo. (1 ton) of coal, and 12 per cent. of coke fuel used. The result is, therefore, that benches of 8 retorts have already produced 56,596,161 cubic feet of gas without any repair—a fact never reached in any other gas works or by any other furnace in the world."

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August 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$466,000	50	70	90
Equitable	2,000,000	100	80	85
Harlem	2,000,000	50	121	123
" Bonds	170,000		—	—
Manhattan	4,000,000	50	300	305
Metropolitan	2,500,000	100	230	235x
" Bonds	658,000	—	107	110
Mutual	3,500,000	100	127	129
" Bonds	1,500,000	1000	104	106
Municipal	3,000,000	100	207	210
" Bonds	750,000		107	110
New York	4,000,000	100	157	162
Northern	125,000	50	—	80
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	127	129
Citizens	1,200,000	20	89	91
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	142	145
" Bonds	300,000		104	108
Peoples	1,000,000	10	75	80
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	90	92
Nassau	1,000,000	25	102	107
" Ctfs	700,000	1000	85	90
Williamsburgh	1,000,000	50	115	125
" Bonds	1,000,000	—	104	108
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	100	104
" " Bonds	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			187	190
Consolidated, Balt.			52	53
" Bonds			109	111
Central, S. F., Cal.			51	55
Capital, Sacramento, Cal.			59	60
Hartford, Conn	750,000	25	112	120
Jersey City	750,000	20	145	150
Laclede, St. Louis, Mo.	1,600,000	100	98	—
Louisville, Ky	1,500,000	50	124	130
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	166	170
Oakland, Cal			28	29
Peoples, Jersey City		—	75	80
" " Bonds			—	—
Paterson, N. J		25	96	99
Rochester, N. Y		50	70	80
Washington, D. C	2,000,000	20	185	195
Wilmington, Del		50	174	—
Yonkers		50	—	40
St. Louis, Missouri	600,000	50	—	238
San Francisco Gas Co. San Francisco, Cal.			50	51

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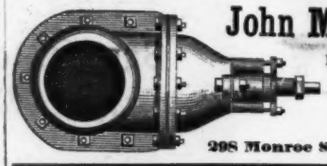

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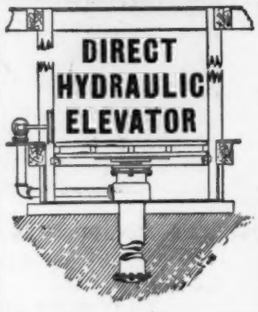

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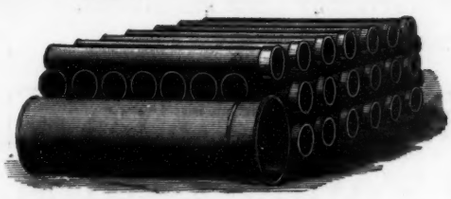

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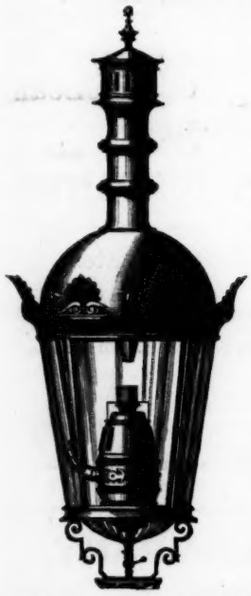

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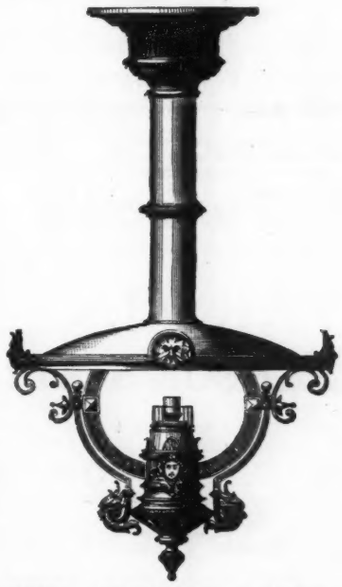

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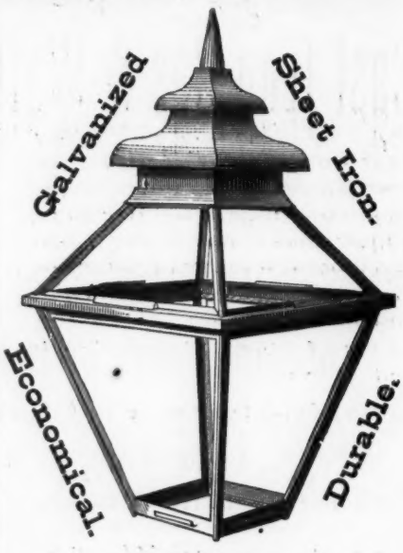

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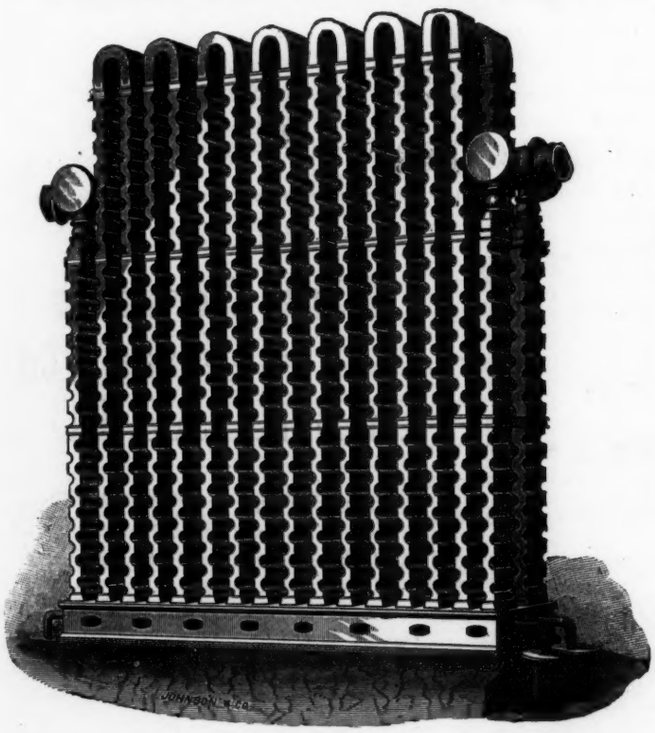

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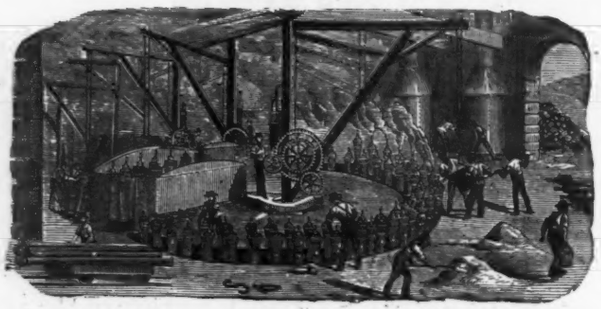

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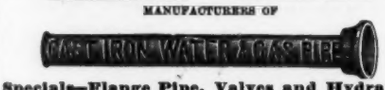

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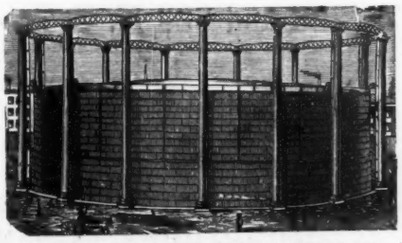

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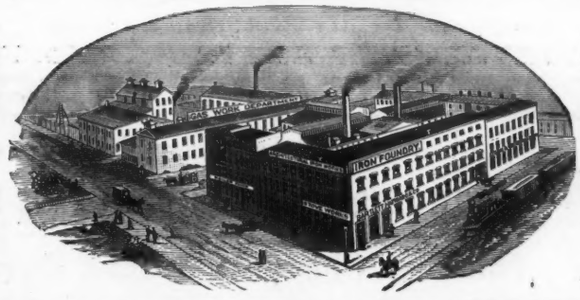

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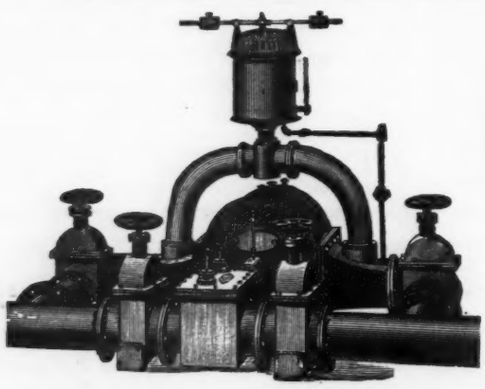

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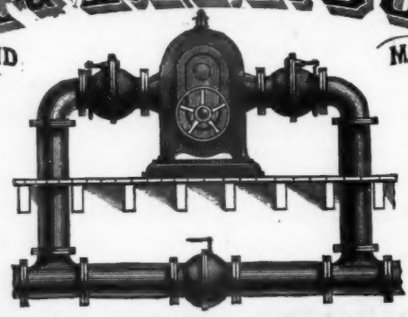

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